

THE STUDY OF
URBAN GEOGRAPHY
Second Edition

To Man

THE STUDY OF URBAN GEOGRAPHY

Second Edition

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PREFACE

This book is intended to provide an outline of urban geography for those undergraduates at universities or students in further education who wish to specialize in urban geography to an extent greater than is usually provided by general courses on human geography. Changes in the concepts of geographers, and in academic work generally, make it clear that such a work cannot be concerned with discrete blocks of subject matter, for the general problem under review is urbanism and the approach geographical. But this opens up a vast field of enquiry and within that field any finite study of this nature must be selective and present a personal view of what an undergraduate can and should be expected to consider. *This view is my own and I am solely responsible for it.* What I hope this volume does is provide a continuation from the elementary and general texts in human geography and a lead towards the more specialized studies which the graduate student would wish to follow. Perhaps it is worth adding that in the title the emphasis should be on *study* and not on the definite article!

This view of the study of urban geography has been built up by experience in teaching at Aberystwyth and by contact with fellow urban geographers in Britain and America. It is impossible to acknowledge all those who have in some way helped but I would particularly wish to mention Professors Robert McNee and Howard Stafford (Jr) of the Department of Geography of the University of Cincinnati. Much of the material was discussed with them and with the graduate students of that Department in 1967-68. I would also like to put on record my appreciation of a Fellowship from the US National Science Foundation which enabled me to visit the United States and work for a year at Cincinnati. It was during that year that much of the basis of this book was established. I would also like to acknowledge the friendly and helpful comments of two other members of that Department, Dr K. B. Ryan and Dr Peter Halvorson, now of the Department of Geography at the University of Connecticut (Storrs).

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Finally Dr Ronald Jones of Queen Mary College read the manuscript and made many valuable suggestions both as to content and presentation

The maps for the book were drawn by Mr Morlais Hughes, Mr M Gelly Jones and Mr E James, and I am grateful for their cartographic expertise I would also like to acknowledge the ready help of Mrs Mair Jenkins in preparing the final version

Lastly I would like to acknowledge the assistance of my wife both in a general and a particular sense Not only has she accompanied me on many 'field excursions', and not always to the most attractive parts of towns and cities, but she also read and typed the original manuscript It is appropriate that the volume be dedicated to her

PREFACE TO THE SECOND EDITION

In this second edition an attempt has been made to extend two themes which were introduced but not developed in the first edition These are the behavioural approach both in relation to central place concepts and the choice of residential location, and the citizen's image of perception of city space Necessarily much is omitted or dealt with summarily, for the constraints of time, length and costs have all to be considered Even so the conclusion has been completely rewritten in an attempt to relate the book to some broader issues In addition a number of minor changes have been made and the references and recommended reading lists have been brought up to date

I have had the advantage of discussing much of this material with Professor K Corey of the Department of Community Planning at the University of Cincinnati and Professor W K D Davies of the Department of Geography at Calgary, and I am grateful for their advice My particular thanks are due to my colleague Dr C R Lewis, who shares with me the teaching of urban geography at Aberystwyth He has helped both through constant discussion and by reading the additional matter As usual, however, the final responsibility rests with the author

Harold Carter
Aberystwyth, Winter 1975

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I INTRODUCTION: THE STUDY OF URBAN GEOGRAPHY

If it be regarded as a distinct systematic or topical study within the general field of geography, urban geography is a comparatively young branch of the subject. It was certainly not taught as a specialism in the same way as geomorphology or climatology, or indeed political geography, in university departments prior to the Second World War. This is easily understandable. Urban geography cannot claim to be a systematic study in the sense that it is concerned with those processes which, in the context of a culture, operate to create spatial patterns. These processes are economic, social and political and their study rightly generates the systematic themes within human geography. Urban geography, in contrast, considers all these processes in relation to one phenomenon, the city. It has tended, therefore, to concentrate on consequence, rather than process, though this tendency may perhaps be changing. Towns have always been of interest to the geographer and from the earliest times regional geographers have dealt with them. Thus Strabo in his *Geography* was well aware of the importance of location, 'the natural advantages [of a place] should always be mentioned, since they are permanent. Advantages which are adventitious are liable to change: those which continue, come to be regarded by posterity, not as works of art but as the natural advantages of a place, these, therefore, it is evident we must notice'¹.

But in spite of the endeavour to place emphasis on advantages of location, the geographical study of towns became essentially descriptive. Strabo himself wrote of Lyons, 'Lugdunum, situated on a hill, at the confluence of the Saône and the Rhône, belongs to the Romans. It is the most populous city after Narbonne. It carries on a great commerce, and the Roman prefects here coin both gold and silver money'². This is followed by a description of the temple dedicated to Caesar Augustus. This sort of 'digest' account long stood as the standard way of dealing with towns although occasionally location was seen as a controlling factor. In the great atlas of town plans *Civitates orbis terrarum* published in the late sixteenth century, the wealth of Lyons is

¹ H. C. Hamilton and W. Falconer, Editors (1912) *The geography of Strabo*, 1, 182 (London)

² H. C. Hamilton and W. Falconer (1912) 287

clearly related to its position, 'Its wealth comes from the aforementioned rivers, for because they pass many towns and flow into the sea, and because the city stands in the centre of Europe and is counted the heart of France, such rivers are a good means of conveying all things out of and into all the chief countries of Europe'³ But in general such relationships were rarely stressed. A typical example is William Frederick Martyn's *The geographical magazine, or new system of geography* published in 1793.⁴ He comments that 'It is impossible in a work of this nature to expatiate on everything beautiful or curious in the various cities and towns which present themselves in different countries, nor can we do justice to the numerous architectural beauties with which England abounds'⁵ After dealing with London, Martyn continues, 'Bristol, reckoned the second city of England for its extent and population, is more remarkable for its commerce and opulence than for any curious or beautiful structures it contains and indeed all the other towns and cities of England have little more to recommend them to our notice than their commerce and the conveniency of their situations'⁶ The whole geography of towns was in this way briefly dismissed, although the growing influence of industrialism meant that the detailed recording of the nature of trade and commerce became more important. Even so there was little formal method. John Pinkerton in his *Modern geography, a description of the empires, kingdoms, states and colonies in all parts of the world* published in 1807 wrote, 'In giving a brief account of the chief cities and towns in England, a few of the most important shall be arranged according to dignity, opulence and population, and the others shall be stated without preference, in a kind of progress from the south-west to the north'⁷ In this progress the author becomes uneasy and excuses his omissions, 'In a chorography of England, Leicester and Shrewsbury might deserve description, but its geography can only embrace the most important topics'⁸ From this it appears that geography took on the aspect of a descriptive gazetteer, although it was only concerned with the principal parts. 'It's something like learning Geography
Principal Rivers Principal Mountains Principal Towns—
Why what are those creatures making honey down there?' Thus Alice

³ R. Oehme (1965) *Old European cities*, 73 (London)

⁴ W. F. Martyn (1793) *The geographical magazine or new system of geography* 2 volumes (London)

⁵ W. F. Martyn (1793), 2, 404

⁶ W. F. Martyn (1793), 2, 405

⁷ J. Pinkerton (1807) *Modern geography, a description of the empires, kingdoms, states and colonies with the oceans, seas and islands in all parts of the world* (London)

⁸ J. Pinkerton (1807), 77

⁹ J. Pinkerton (1807), 89

built up her geography of Looking Glass Land, although with an astute aside on the economic base, and it is not surprising that this approach resulted in a demand for an association, rather than a narration, of facts. This reaction was clearly apparent in the first issue in 1901 of the periodical now called *Geography* which contained a paper on 'The position of towns'.¹⁰ 'The magnificence of a town's buildings,' wrote the author, 'the greatness of its population and commerce are stated as though they were causes of the town's importance, instead of being the most convincing proofs of peculiar advantages of position'.¹¹ And he concluded, 'Let us once and for all give up the rote learning of towns, products and points of interest as separate facts in favour of a general but comprehensive grasp of distribution, and the logical consequences of physical position'.¹²

The replacement of description by interpretation of location laid the foundations for urban geography to develop as a special study. The first decade of the present century saw the appearance of two major works. Karl Hassert's *Die Städte geographisch betrachtet*, published at Leipzig in 1907,¹³ was the first volume to present an outline of urban geography. Raoul Blanchard's *Grenoble, étude de géographie urbaine* published in 1911¹⁴ was the first classical study of a single city. To a large extent, developments in urban geography mirrored those in geography as a whole. At this period the subject was finding a basis in working out the consequences of the physical environment, for in spite of the nebulous concept of 'man, the master of the possibilities' of the physical world, the great regional monographs were firmly based on lithology and relief. The association between the 'separate facts' lay in the causal effect of physical geography. It was inevitable that at the time the unifying basis of town study should be found in those factors of location which controlled urban development. Blanchard wrote in the foreword of his book, 'The basic concept of this study is to explain the origin and development of the town as a function of the physical conditions of its situation',¹⁵ and in the last lines he concluded, 'From its origin right down to its present extension, Grenoble is the town at the junction of types of terrain, at the confluence of rivers. In spite of human changes nature always asserts its rights, even on an organism as complex as a town'.¹⁶

¹⁰ B. B. Dickinson (1901-2) 'The position of towns' *Geogr. Teach.* 1, 97.

¹¹ B. B. Dickinson (1901-2), 97.

¹² B. B. Dickinson (1901-2), 108.

¹³ K. Hassert (1907) *Die Städte geographisch betrachtet* (Leipzig).

¹⁴ R. Blanchard (1911) *Grenoble, étude de géographie urbaine* (Paris).

¹⁵ R. Blanchard (1911) 5.

¹⁶ R. Blanchard (1911), 159.

There followed a whole series of studies,¹⁷ which can conveniently be called the 'site and situation' variety, in which the main end was to demonstrate that the character of towns was to be derived from their physical locations.¹⁸ The key word in such studies was 'nodality'—hence the vast range of diagrams attempting to demonstrate the nodal situation of settlements. In this sort of context there was little room for the further development of a true urban geography and little incentive to gather a multitude of single studies under the heading of the geography of towns.

The first general review of urban geography was made by Auroousseau in 1924.¹⁹ He comments that city geography embraces such a large section of human geography that it is hardly a specialization at all. Thus at the outset, and in consequence of the problems involved in identifying urban geography as a systematic study, he is unsure about the nature of urban geography. An introductory section on method outlines Blanchard's approach and leads into the following statement: 'It is an astonishing fact that the greatest interest has centred upon the individual town. Geography is so deeply concerned with the distribution of things that an interest in town distribution seems to be an obvious consideration. Little attention has been given to it.'²⁰ Auroousseau then proceeds to note Fleure's contributions to the regional study of towns²¹ and discusses the beginnings of functional study together with the early work on town status. Examples of town studies from different parts of the world are then given, and in conclusion 'the lack of extended studies in the United States' is recorded! The work makes extremely interesting reading for it stands at a point when rapid changes were taking place, the methods of the past and the problems of the future are uneasily associated in a review of a nascent specialism.

The changes noted above were largely a result of the reaction against the restricted aim of many town studies and this reaction was derived from two sources. The first was a direct rejection of the stereotyped 'site and situation' formula as it was slowly realized that such a limited consideration could not be abstracted from what was a complex,

¹⁷ For example, J. Levanville (1913) *Rozen, étude d'une agglomération urbaine* (Paris).

¹⁸ It is interesting to note that the only map, apart from one on general location, in H. J. Fleure (1924) *Cities of the Po basin: an introductory study* *Geogr. Rev.* 14, 345 is a map of January and July temperatures!

¹⁹ M. Auroousseau (1924) *Recent contributions to urban geography: a review* *Geogr. Rev.* 14, 444.

²⁰ M. Auroousseau (1924), 445.

²¹ See note 18 and H. J. Fleure (1920) *Some types of cities in temperate Europe* *Geogr. Rev.* 10, 357.

functioning economic and social system Crowe, writing on methodology in 1938,²² seized on the treatment of towns as indicative of the inability of geographers to penetrate beyond the superficial. He criticized the tendency 'to crystallize upon the distribution of inanimate objects and the morphology of static patterns'. He pointed out that the application of the 'site and situation' formula was meaningless 'where site had nothing but historical interest and situation was viewed in terms of routes and not currents of movement'.²³ But already in 1933 Walther Christaller's great work on the central places of south western Germany²⁴ had been published and, although its impact was not to be felt until the post-war years, the revolution Crowe had demanded was under way.

The second source of reaction came from the nature of town growth itself. The vast extension of urban areas under the stimulus of new modes of transport brought severe problems of interpretation. A site-situation approach was also meaningless when the large urban agglomerations had to be considered. In 1915 Patrick Geddes had been forced to devise a term for these new growths and the word 'conurbation'²⁵ came into circulation. The simple growth plan, the main element of the morphological approach was increasingly shown to be inadequate. In the 1920s the Chicago school of human ecologists was already considering the variety of economic and social forces which resulted in the segregation of urban land uses.²⁶ The attention of geographers was thus directed towards the complexity of the townscape and away from the apparent simplicity of growth and general plan.

By the end of the Second World War, therefore, the situation had been reached where a rapid growth of urban geography was inevitable. Preliminary foundations had been laid and many of the basic ideas had been propounded, although in isolation. In many ways the recent expansion in urban geography has been mainly concerned with the exploitation of ideas already in existence in the 1930s.

From a purely practical point of view there was an urgent need, certainly in most European cities, to deal with the terrible conditions brought about by uncontrolled nineteenth century development. Wartime bombing resulted in the need for reconstruction. Redevelopment, reconstruction, both demanded planning. In one of the earliest

²² P. R. Crowe (1938) *On progress in geography* *Scott. geogr. Mag.* 54

²³ P. R. Crowe (1938), 18

²⁴ W. Christaller (1933) *Die zentralen Orte in Süddeutschland* (Jena), translation by C. W. Baskin (1966) *Central places in Southern Germany* (Englewood Cliffs, N. J.)

²⁵ P. Geddes (1919) *Cities in evolution* 14-15 (London)

²⁶ For an outline see G. Sjöberg (1965) *Theory and research in urban sociology* chapter 5 in P. M. Hauser and L. F. Schnore (1965) *The study of urbanization*, 157 (New York)

post war studies R. E. Dickinson wrote,²⁷ 'This book is not about planning. It is concerned with certain aspects of the inherent spatial or geographical structure of society upon which planning must be based, and it insists that knowledge of the anatomy of society must precede the treatment of its defects'.²⁸ The employment of many geographers in town planning and the interaction between academic urban geography and the practical and applied spheres of planning provided an active stimulus to development. Commercial concerns began to realize the need for rigorous analysis before developments were started and the study of store location and market survey²⁹ also impinged on methods of investigation in urban geography.

Finally, there were changes within academic geography itself which made the development of systematic studies more acceptable. The old convention of 'the relation between man and his (physical?) environment' with its impossible intellectual position, was slowly replaced by a new cliché, 'the areal differentiation of the earth's surface'. The 'physical basis' was accordingly deprived of its basic role, and, of the infinite variety of operative factors, no single one was given an *a priori* importance. In economic geography this change slowly released a flood of pent-up energy seeking the universal rather than the multiplication of detail. This flood finally burst through on the urban sector where 'model building' was first propounded in human geography. At the same time, urban areas had become such important parts of the landscape in western countries that the simplest geographical description had to come to terms with them: the need for systematic study was evident. The eastern states of America had to be interpreted in terms of 'Megalopolis',³⁰ the foundations of the contemporary geography of the Netherlands lie in Randstad, Holland,³¹ not the sub-boreal peat. All these conditions formed a great stimulus to the geography of towns and in the last two decades an enormous mass of literature has accumulated. But urban geography was never at the outset conceived as a well defined, systematic study, Topsy-like it just 'grewed', although to such an extent that there is no need to present any argument for its recognition. But it had been developed by a large number of specialist workers engaged on particular aspects and at this stage, therefore, it became necessary to show that it formed a

²⁷ R. E. Dickinson (1947) *City region and regionalism* (London).

²⁸ R. E. Dickinson (1947) *ibid.*

²⁹ For example W. Applebaum (1961) Teaching marketing geography by the case method *Econ. Geogr.* 37, 48. P. H. Thorpe, editor (N.D.) *Great Britain, a 'geographical' marketing and media survey* (London).

³⁰ J. Gottmann (1961) *Megalopolis, the urbanized northeastern seaboard of the United States* (New York).

³¹ For a description see P. Hall (1966) *The world cities*, 95 (London).

coherent field of study based on geographical principles of investigation. This need dominated much of methodological writing on urban geography during the 1950s. Mayer, in a series of papers,³² outlined the main points on which geographers had concentrated and demonstrated these as forming related parts of a coherent systematic study. The general content of urban geography as propounded at this time can be summarized as follows.

At the outset the major concern is essentially a geographical one. 'Geography,' writes Hartshorne, 'is concerned to provide accurate, orderly and rational description and interpretation of the variable character of the earth's surface.'³³ Since one hopes, probably in vain, to be rarely inaccurate, seldom disorderly and never irrational, it is possible to omit the adjectives and argue that the geographer is concerned with the analysis of the variable character of the earth's surface. On that surface, the populations and the buildings which are agglomerated together to make up towns constitute the special interest of the urban geographer, they are abstracted from the totality for separate, topical study. Since the bulk of the population of the western world lives in towns and the problems of the urban environment are paramount at the present, the importance of this study in academic geography and its relevance to applied geography³⁴ need not be stressed further.

The town as a unit feature of the earth's surface has, like all other features, two associated aspects. The first is location or position, the second is form and internal structure. In simplest fashion these two aspects emerge clearly when differences of scale are considered. On the atlas map towns are represented by conventional symbols and the main geographical implication is a concern with location, or with the town as a distributed feature. On maps of the scale of one inch or six inches to the mile, the town is no longer shown by conventional means but it is seen to have individual form or shape as well as internal structure, although this is, as yet, displayed only in a generalized way. On the scale of twenty five or fifty inches to the mile, the internal structure becomes apparent in detail, in the form of streets, blocks and individual buildings, although still in an unreal, two-dimensional way. Finally on the ground, the real town is seen to be three dimensional, for each building has height and this must be added to the geographer's appreciation. Indeed, the geographer, confronted with the town

³² H. M. Mayer (1951) *Geography and urbanism* *Scient. Mon.* 63, 1. H. M. Mayer (1954) *Urban geography*, chapter 6 in Preston James and G. F. Jones, editors (1954) *American geography, inventory and prospect* (Syracuse, N.Y.)

³³ R. Hartshorne (1959) *Perspective on the nature of geography*, 21 (London)

³⁴ See chapter 2, below

fabric, is also made to realize that the fourth dimension of time is involved, for many of the structures and much of the form are inherited from past periods. But this progress through the scales emphasizes the two main themes of study introduced at the outset, the town as a distributed feature and the town as a feature with internal structure, or in other words, the town *in* area and the town *as* area.

It is axiomatic that location can only be understood through function, what a town does, or did in the past, determines its location and controls its growth. It is possible to derive two associated concepts from the consideration of functions. These are

1. *The nature of urban functions* that is, we seek to answer the questions, What are the sorts of activities which dominate the whole range which towns perform? In particular, to what extent are specialized functions carried out and what are they?
2. *The stature (status) of urban services* that is excluding specialized functions, we seek to answer the question. To what extent does the town take part in central place activities?

It is dangerous to confuse these two although they are so clearly bound together, we need a 'separate study of resource oriented functions and other activities whose location central place theory cannot explain and the subsequent superimposition of such functions on to the areal pattern of central places'.²⁵ Here therefore are two critical lines of investigation which are shown in figure 1-1.²⁶ The link between them is associated with accessibility and the transport role has, therefore, been isolated as a distinctive feature to be considered apart.

The morphology of towns, or the study of internal structure, is related to three variables. These are plan or layout, land use or the function of buildings and the architectural style of buildings. These three vary independently and produce an infinite variety of urban scene. Each has to be considered separately and then the relationship between them demonstrated in a study of the whole townscape as shown in figure 1-1. This diagram is presented for two reasons, it indicates the relationship between the various areas of investigation which have formed part of urban geography and at the same time demonstrates or implies areas where investigation is necessary.

The organizing concept behind figure 1-1 carries the implication that urban geography should be a unitary study. Function and morphology, the town in an area and the town as an area, it is suggested,

²⁵ W. Isard (1960) *Methods of regional analysis*, 227 (New York)

²⁶ For another diagram in which a similar analysis is attempted, see D. Thorpe (1966) *The geographer and urban studies, Dept Geogr. Univ. Durham Occ. Pap. Ser. B*, 3

should not be thought of as two clear cut and distinct lines of investigation. They are closely linked: separation is only for convenience of analytical study, and it should be stressed that all these separate aspects, all these points of study, find their place in urban geography in so far as they build back into the general regional pattern of towns and townscapes. In this way the systematic study forms an essential part of the whole, which geography remains.

For some urban geographers this last sentence will appear either as a restriction or an irrelevance.²⁷ It seems to imply that discrete areas of subject matter can be used to identify various disciplines rather than the methods they employ and in so doing institutes a later stage in the evolution of the geographer's concern with towns than that sketched at the outset of this chapter. This can be identified as the stage where the simplistic 'man in relation to his environment' was succeeded by 'the description and interpretation of the varying features of the earth's surface', or 'areal differentiation' in a shorter version. In relation to this newer theme the old phrase, 'but it's not geography', was quoted and retained a relevance. But if the emphasis is now to be on the way the geographer looks at things and not on the material studied then it is possible to transform the whole argument, as it has been so far outlined, so that the *subject matter* becomes the phenomenon of urbanism and the process of urbanization and the *approach* is geographical in so far as it is concerned with spatially distributed aspects. What distinguishes the geographer is the way he thinks about urbanism not any specially segmented section of it. It follows that figure 1-1 might be of interest in that it depicts the various fields in which geographers have worked and it might be useful in that it points up certain inter-relations which have been ignored in recent enquiry. But at the same time it is misleading in so far as a scheme for urban geography should demonstrate the value and significance of method in the study of urbanization and not be so overtly dominated by the concern for a holistic 'subject' geography which has been abandoned by many as not academically and intellectually viable or indeed worthwhile.

The conceptual framework for a study of urban geography ought therefore, to be concerned with 'urbanization' and not 'Geography'. At this point it is perhaps worth mentioning that urban history has faced precisely the same problems and most urban historians have come to the same conclusions. But to establish a framework common to all who are interested in urbanism presents severe problems. Nevertheless,

²⁷ A recent book which covers much of the field conventionally ascribed to urban geography is entitled *Geographic perspective on urban systems*. Making due allowance for jargon the implications are clear: the subject is 'urban systems' which can be considered from a number of perspectives, one of which is 'geographical'.

at least one partially successful attempt has been made by Foley and it is significant that it was derived from a planner's attempt to show the way planning interests related to urbanism, or at least to metropolitan structure.³⁰ His scheme, he claims, was developed

A ASPATIAL ASPECTS B SPATIAL ASPECTS

I NORMATIVE OR
CULTURAL
ASPECTS

Social values
Culture patterns
Norms
Institutional setting
Technology

Spatial distribution of
culture patterns and
norms
Values concerned with
qualities and
determination of
spatial patterns of
activities population
and physical
environment

II FUNCTIONAL
ORGANIZATIONAL
ASPECTS

Division and
allocation of
functions
Interdependence
Activity systems—
persons and
establishments in
their functional-role
sense

Spatial distribution of
functions and
activities
Linkages—spatially
concerned
Spatial pattern of
establishments
by functional type

III PHYSICAL
ASPECTS

Physical objects
The Geographical
environment
Man-developed
improvements*
Population

Spatial distribution
of physical objects
Patterns of land forms,
building roads
people

Figure 1-2: Selected aspects of metropolitan structure: a conceptual view After D. L. Foley (1964)

about a common conceptual framework and a common language for exchanging ideas.

In figure 1-2, which depicts Foley's basic notions, the vertical distinction is between those aspects which are aspatial, and where there is no concern with location or distribution, and those where it is

³⁰ D. L. Foley (1964). An approach to metropolitan spatial structure; in M. Webber et alie (1964): *Explorations into urban structure*, 21-78 (Philadelphia).

the dominant concern. The horizontal divisions are concerned with the different aspects which can be considered, and these are threefold. The first is concerned with the values of the social group and is termed cultural, the second is concerned with the functions and roles of people and institutions within the social group and is called the functional or organizational aspect, the third relates to visible physical objects in the city including buildings and people. All these have spatial consequences which are indicated under column B. In the organization of the scheme, functional organization occupying a middle position is seen as mediating between the norms and values of a population, which are culturally derived, and the physical reality of the city on the earth's surface.

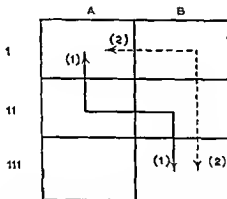


Figure 1-3: Retail location (1) and housing type (2) in relation to the conceptual scheme shown in figure 1-2

The geographer's attention is clearly pre-empted by the spatial aspect but the framework emphasizes that this cannot be simply abstracted as 'urban geography', for there are vital derivations from aspatial aspects which first have to be understood. Within the scheme it is possible to indicate as examples the paths of controlling relations in retail location and housing type. The study of retail shops and their locations could be indicated by the first path shown on figure 1-3. The problem is rooted in the norms and patterns of shopping habits and in the technology of retailing. These in turn can be translated into terms of functional organization and structuring and these terms carry with

their spatial implications which lead to the actual spacing of retail outlets within the city. The second path indicates the relationship implicit in a study of a type of housing—for example inter war semi-detached housing in Britain. Again the source of this housing character lies in the values and cultural norms of the population, how people see themselves in social terms determines the type of housing they will look for and where they will live. The phrase 'where they will live' shows that the move has been made into the 'spatial column'. Via a whole series of associations and linkages the pattern of housing types emerges in section 111B of the diagram. The movement is not a one way process for the area and type of house can result in the acquisition of social values. Thus the techniques of social area analysis and the divisions they reveal are concerned with sections 1B and 111B but have a root relation with 1A and implications for 111B. The diagram can also be employed on an individualistic as well as an aggregative basis, the values and opinions of the person in a decision making context can be encompassed as well as the cultural norm and thus the framework can be adapted to a behavioural approach.

The scheme may also be extended in two ways. The first would be to cover both 'form' and 'process' as in figure 1-4. Here 'form' is taken to refer to the morphological or anatomical aspects and 'process' to functional or physiological aspects. Paths traced in this new structure become more complex and this is compounded when the second extension takes place, which is related to the time dimension so that a development sequence is brought in.

Each worker in the field of urbanization can place his work within this frame and here the urban geographer can see himself not as having concern with a chunk of subject matter but contributing his particular expertise to the problem of understanding the urban scene. If figure 1-1 has to be related to figure 1-2, then it will be seen to be mainly concerned with sections 11B and 111B. The relations via 1B and 1A are not encompassed and those with 11A are only implied. It is worthy of note that it is with the extension of enquiry in these directions that much of urban geography is now concerned.

One further attempt to sketch the field of urban geography can be considered. Davies³⁹ has suggested that there are three components in a conceptual model of urban geography, components which are closely interlinked but which can be isolated for purposes of study. These are the elements which make up the urban complex, the perspectives used

1 Normative or cultural aspects

2 Functional organizational aspects

3 Physical environmental aspects

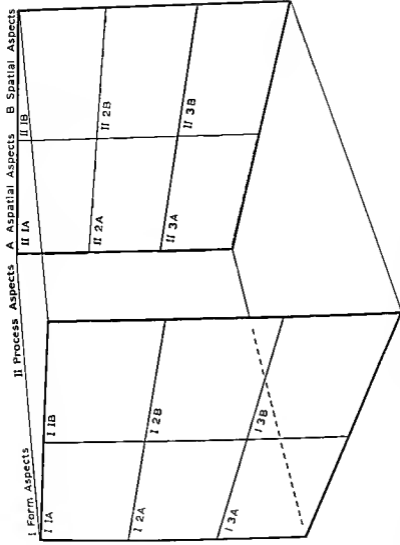


Figure 1-4 The extension of the conceptual scheme in figure 1 2 to include form and process After D L Foley (1964)

decides and acts in relation to that perception, becomes the building block towards the larger scale interpretation of the earth's surface

The second trend is perhaps more revolutionary in the sense that it looks towards the abandonment of systematic studies, such as that of urban geography. This has been effectively argued by Peter Gould in considering 'The open geographic curriculum'.⁴¹ Such categories as urban geography, Gould contends, have outlived their usefulness, becoming limitations upon geographic instruction and pedagogic imagination. Thus Gould maintains that it is of little value to discuss tariffs in economic geography, administrative boundaries in political geography and housing constraints in urban geography, because the critical point is 'that there are barriers to all sorts of human flows across geographic space, including the barrier of distance itself, suitably warped and twisted by transportation and communications technology'. A modern geography should therefore be concerned with movement and barriers to movement, a higher order concept than the limitation to systematic divisions easily allows. This is a cogent argument but at this stage it is merely presented so that the reader can perhaps consider some of the 'higher order concepts' that might be implicit in the treatment of this conventional systematic study.

Figure 1-1 indicates the basic outline of this book and sketches a limited field of urban geography. The further views have been included to emphasize that the limitations implicit in any finite text bear little relation to the infinite areas of study which can be identified once the subject matter becomes the phenomenon of urbanism in a world wide context and the approach geographical. It has already been argued that unlike the traditional systematic studies, urban geography has a particular phenomenon for study and not a particular process. This opens up to the urban geographer not only the widest possibilities for study, but also the widest range of studies and a vast literature. The range of this book must be limited and it can only be argued that the limitations have been consciously set.

*Notes on further reading**

The general material which is usually covered by urban geography can best be appreciated by consulting the contents of some of the standard texts. Each of the following also has an introductory chapter which is relevant.

BEAUJEU GARNIER, J and CHABOT, G (1967) *Urban geography*, translated by Beaver, S and Yglesias, G M (London)

⁴¹ Peter R. Gould (1973) 'The open geographic curriculum' in R. J. Chorley, editor *Directions in geography* 253-84 (London)

* These notes have been added at the end of each chapter as a brief guide. In general the footnotes which give reference to the major sources should be followed up for particular issues.

- BERRY, B J L and HORTON, F E (1970) *Geographic perspectives on urban systems* (Englewood Cliffs, N J)
- JOHNSON, J H (1968) *Urban geography: an introductory analysis* (London)
- JONES, E (1966) *Towns and cities* (London)
- MURPHY, R E (1966) *The American city* (New York)
- SMILES, A E (1953) *The geography of towns*, first edition (London)

The main sources have been indicated in the footnotes and the most useful contributions are

- DAVIES, W K D (1970) Approaches to urban geography (see footnote 37)
- FOLEY, D L (1964) An approach to metropolitan spatial structure (see footnote 38)
- HAUSER, P H and SCHNORE, L F (1965) *The study of urbanization* (see footnote 26)
- THORPE, D (1966) The geographer and urban studies (see footnote 36)

In a purely bibliographic context reference can be made to The Council of Planning Libraries Exchange Bibliographies (Monticello, Illinois). A very large number of bibliographies is available and many topics of direct interest to the urban geographer are covered.

A worthwhile addition to the urban literature has been the series of publications prepared for the Open University course entitled *Urban development* and published by the Open University Press at Walton Hall, Bletchley.

2 THE PROCESS OF URBANIZATION

1 DEFINITION

The first and immediate problem that arises in the study of towns is that of their definition. What does the term 'town' or 'city' imply as against 'village' or 'hamlet' and what is the real nature of the distinction between that which is 'urban' and that which is 'rural'? The acceptance of a specialism entitled 'urban geography' implies that there is an area of study which is but part of 'settlement geography' and which is, in particular, contrasted with that of 'rural settlement'. In reality, the differences between 'urban' and 'rural', which are so easily made in an everyday way, become very difficult to portray in precise and scholarly terms. It is possible to identify three sources from which these difficulties arise.

a *The settlement continuum*

The United Nations *Demographic yearbook* for 1952¹ was devoted to the problems of providing adequate data on the world urban population. It concluded that, 'There is no point in the continuum from large agglomerations to small clusters or scattered dwellings where urbanity disappears and rurality begins, the division between urban and rural populations is necessarily arbitrary'.² Thus as one goes down the scale from the largest metropolis, or indeed from megalopolis, to the single isolated farm it is impossible to identify a dividing line which is conceptually meaningful. This is reflected in the fact that there is a variety of names for the settlements near the assumed border. The oldest is 'suburb', although its original meaning was somewhat different, but in addition the terms 'sub-town', 'urban village' and 'rurban'³ have been employed. It follows from this that the most universal and apparently attractive method of defining a town by a fixed minimum population is unreal and that although the notion of

¹ United Nations (1955) *Demographic yearbook 1952* (New York)

² United Nations (1955)

³ The term 'rurban' was coined in one of the earliest of central place studies, C. G. Galpin (1915) *The social anatomy of an agricultural community* (Agricultural experiment station of the University of Wisconsin) Res. Bull. 34

size is involved it is difficult to translate it into specific terms. Apart from the fact that the figure used will be entirely dependent on arbitrary and often anachronous boundaries, the real range of minima employed in national censuses is ample testimony to this problem. This can best be seen in Annex II of the United Nations, Department of Economic and Social Affairs publication, *Growth of the world's urban and rural population, 1920-2000*, which presents a 'List of definitions used in the estimation of "Urban" populations as nationally defined'.⁴ An extract from this is reproduced in table 2-1. All countries without a city of at least 100,000 inhabitants in 1960 are omitted, but even so the minima range from 1000 (e.g. Canada) to 30,000 (e.g. Japan). The only solution proposed was that national data should be presented also according to a standard scale.⁵ The reasons for these differences

table 2-1:

(a) Frequency of use of criteria in delimiting urban populations in national censuses

<i>Criteria</i>	<i>Frequency of use</i>	
	<i>Sole use</i>	<i>Used in conjunction with other criteria</i>
1 Size of population	23	26
2 Density of population or of housing	1	10
3 Predominant type of economic activity	1	7
4 Urban characteristics other than (1) to (3) above or unspecified urban characteristics	3	13
5 Administrative function or structure e.g. type of local government etc	3	0
None specified*	56	0

*Note in relation to unspecified criteria. Considering that a criterion of administrative function is implicit where the area nomenclature is administrative centres of minor civil divisions and a criterion of administrative structure can usually be assumed where the nomenclature is cities, towns etc. with particular types of local administration, one can also say that the fifth criterion for the selection of urban units was implicit in sixty-seven censuses and that no criterion was suggested in only twenty-nine censuses.

⁴ United Nations (1969) *Growth of the world's urban and rural population, 1920-2000*. United Nations Department of Economic and Social Affairs, Population Studies 44 (New York). An earlier publication with data for countries without cities of over 100,000 is (1950) *Data on urban and rural population in recent censuses* (New York).

⁵ United Nations (1958) *Principles and recommendations for national population censuses* (New York). *Statistical Papers, Series M* 27, 11.

(b) Examples of minimum populations in national censuses

France	1962	Communes containing an agglomeration of more than 2 000 inhabitants living in contiguous houses or with not more than 200 metres between houses and communes of which the major part of the population is part of a <i>multicommunal agglomeration</i> of this nature
Spain	1960	Municipios of 10 000 or more inhabitants
East Germany		Communes of 2 000 or more inhabitants
Belgium		Communes of more than 5 000 inhabitants
Denmark	1960	Agglomerations of 200 or more inhabitants
Canada	1961	Cities, towns and villages of 1 000 or more inhabitants whether incorporated or unincorporated including urbanized fringes of cities classed as metropolitan areas and other major urban areas. In 1961 also including urbanized fringes of certain smaller cities if the population of city and its urban fringe was 10 000 or more
Japan		Urban municipalities (all shi and the ku of Tokyo to) usually having 30 000 or more inhabitants and which may include some rural area as well as urban cluster
Israel	1961	All settlements of more than 2 000 inhabitants except those where at least one third of the heads of households participating in the civilian labour force earn their living from agriculture
Mexico		Localities of 2 500 or more inhabitants

lie in the differing cultural and economic situations involved. In Iceland, for example, a settlement of 300 or more people is normally concerned with urban functions, for the rural environment precludes such large agglomerations solely concerned in agricultural pursuits. In the south of Spain or of Italy rural settlement is basically agglomerated and 'villages' may reach totals of 8,000 to 10,000 population. This is due partly to the former insecurity of individual holdings because of banditry and partly to the whole nature of the economic organization of land-holding which has never suffered 'revolution' as in most of north-western Europe. This situation upsets both the layman's idea of towns as somehow being universally bigger than villages as well as the 'size density model' of more sophisticated treatments.* For it is also true that only some of the areas of high population density

* P. M. Hauser (1965) *Urbanization: an overview*, chapter I in P. M. Hauser and L. F. Schnore (editors) (1965) *The study of urbanization*, 11 (New York).

are also highly urbanized. Australia is one of the world's most highly urbanized countries but has a very low national population density, India is not highly urbanized but has a very high population density. It is an accidental thesis that high population density and urbanization are necessarily correlated.

In spite of this, however, it is difficult to reject the argument that urbanization as a process involves two elements: the multiplication of points of population concentration and the increase of the size of individual concentrations. But the technological, economic and sociological correlates of the process are crucial, rather than the nomination of particular sizes.

b The changing concept of urban character

The problem of identification of what is urban has been made all the more difficult by the fact that the concept and, indeed, the reality of what is urban are not static but are continually being changed by new conditions. In early times the town meant 'market town' and the legal possession of a market virtually defined a town. Often the town existed in sharp contradistinction to the surrounding countryside for the town walls were a tangible barrier between the urban and the rural. The growth of the suburb and the construction of several urban 'enceintes' were early to obliterate this ideal state but changes during the eighteenth and nineteenth centuries provided even greater difficulties. Industrialization brought into being a large number of settlements which were certainly not villages, in the sense of being the nucleated settlements of agricultural populations, but neither were they market towns primarily serving the surrounding countryside. They were large tracts of bricks and mortar which broke across the old division. In Britain their status was significantly described under the Public Health Act of 1872 when they became 'Urban Sanitary Districts' and later 'Urban Districts'. There is a wealth of implication in the contrast between a 'town' and an 'urban district'. This in turn has a bearing on the idea of the identification of towns by population size. Large these new agglomerations might be in numerical terms, but few other characteristics proclaimed them to be 'towns'. The situation has been further aggravated by the coming of the motor car and the rapid extension of suburbia. Very often vast areas of low density housing make up settlements in their own right. These have been categorized in subjective terms as 'sub-topia'⁷ or in the case of Los Angeles as 'a hundred suburbs in search of a town',⁸ but even an

⁷ I. Nairn (1958) *Outrage* (London).

⁸ Usually ascribed to J. B. Priestley.

advanced statistical analysis ends by introducing a category called 'sub-urban type towns'⁹

In an academic context the way out of this situation has been to reinterpret the concept of 'market' town by an examination of the functions which the town performs for the surrounding countryside for, it is argued a town is distinguished by its role as the central place for a tributary area. The rural countryside needs a focal point to which its produce can be sent for export and from which its needs can be distributed. 'It is in the cities that the geographies of production and consumption interlock.'¹⁰ This general role is represented in the town by shops, banks and offices and similar institutions and a summation of these should be a measure of urban character. Even the small village has a general shop which carries out these functions so that there is no question of mere 'presence' or 'absence' of a function, but there could be a distinctive 'trait complex' of functional institutions which characterize the town and which signify an urban rather than a village situation. Berry, looking at the system of central places in south west Iowa, states, 'Centres are scaled into five sizes (hamlets, villages, towns, cities and the regional capital) according to the levels or steps of the central place hierarchy'¹¹ Yet this is a completely arbitrary application of nomenclature to the ranks identified and presents no evidence for a conceptual break at the village-to-town level, this is only another step in the hierarchical scale and no more. It would be better, therefore, to call these levels Grade 1, Grade 2 and so on rather than give them the overtones involved by using long established names in general currency. This situation is made more complex by the existence in some countries of periodic markets and fairs, some of which are held in open and isolated areas with no settlement associated at all. It follows that studies of the ranking of settlements according to central place functions have little direct contribution to make on the subject of urbanization and do not provide a universal tool for the study of the urban process. The idea of a certain minimum collection of functions defining what is urban is, therefore, no more helpful than the adoption of a minimum population figure.

c *The inadequacy of official designation*

This third area of difficulty follows from the first two, for if identification of what is urban is difficult in academic terms then the practical

⁹ G. A. Moser and W. Scott (1961) *British towns, a statistical study of their social and economic differences* (London)

¹⁰ B. J. L. Berry (1967) *Geography of market centres and retail distribution*, 2 (Englewood Cliffs, N.J.)

¹¹ B. J. L. Berry (1967), 14

solutions adopted by governments are bound to be *ad hoc* and unsatisfactory. Most countries do have a formal means of identifying what is urban and this is sometimes based on legal title and is neither statistical nor functional in a commercial sense, though somewhat vaguely linked to both. In older countries many towns which have long decayed retain their former status and chartered rights and fight energetically to maintain them, likewise newly grown towns find it a lengthy and cumbersome process to obtain the articles of recognition. On most counts, therefore, the official designation of the urban-rural dichotomy is pragmatic, anachronistic and not helpful. In most cases governments are looking to the evidence of students of urbanization in order to revise the system of government of which this rural-urban break is one feature.

2 MEASUREMENT AND PROCESS

It now appears that this approach to the definition of urbanization has broken down into two problems of a different order.

- a *The measurement of urbanization* is it possible to make a meaningful statement about the urban proportion in any country or area?
- b *The process of urbanization* what are the fundamental concomitants of the process of urbanization?

The first of these is a practical question of procedures for measurement, the second is a more profound question of concept. But they are clearly linked in that the first produces the most direct measure of urbanization from which the second proceeds.

a *The measurement of urbanization*

This problem has already been partly considered in the criticisms offered concerning the definition of the urban proportion in various countries. The whole situation was well illustrated by Meuriot¹² in the early part of the century. However the figures in table 2.2 are analysed, the conclusion is inescapable—Vienna was growing the faster. This is the exact reverse of the anticipated movement in light of historical and political trends of the period. A close scrutiny of the data is therefore required. This reveals the situation in table 2.3 where the relation between the two cities is reversed.

¹² P. Meuriot (1911) *De la mesure des agglomérations urbaines* *Bull. Inst. int. Statist.* 19: 158.

table 2-2: A comparison of the populations of Vienna and Berlin 1900 1910

	Population 1900	Population 1910	Increase
Vienna	1 674 000	2 030 000	356 000
Berlin	1 888 000	2 070 000	182 000

table 2-3: A comparison of the populations of Vienna and Berlin in similar areas 1900 1910

	Urban area in hectares	Population 1900 in comparable areas	Population 1910	Increase 1900 1910
Vienna	17 000	1 674 000	2 030 000	356 000
Berlin	6 000	2 460 000	3 315 000	855 000

This problem is usually stated in terms of 'under-' or 'overbouded' cities.¹³ In the underbouded city, the administratively defined city is smaller than the physical urban aggregate. In the overbouded city the administrative city is larger than the physical urban aggregate. The true bouded city, however, is virtually identical with the urban aggregate.

It follows that any measure of urbanization based upon census data is liable to marked error dependent on the under- or overbouded characteristic. Attempts to avoid this can be made in two ways

(1) *The use of detailed rules for the definition of areas* The most detailed survey of these problems occurs in *The delimitation of urban boundaries* by G. J. R. Linge¹⁴ where the general problems are set out and proposals are made for the definition of the urban areas of Australian towns. Here it will suffice to point out that the Census Bureau of the USA¹⁵ not only identifies 'standard metropolitan statistical areas', which are

essentially city regions, but also 'urbanized areas' where a more limited definition of the settlement itself is attempted. For the 1966 census the 'urbanized areas' were based on enumeration districts which were usually no larger than one square mile and had no more than fifteen dwellings. The urbanized area then consisted of a central city which had a population of 50,000 together with

- 1 Incorporated places with 2,500 inhabitants or more
- 2 Incorporated places with less than 2,500 inhabitants, provided that each had a closely settled area of 100 dwellings or more
- 3 Enumeration districts in unincorporated territory with a population density of 1,000 inhabitants or more per square mile (land devoted to such purposes as railway goodsyards, cemeteries, etc., being excluded)
- 4 Enumeration districts with less than 1,000 persons per square mile if they
 - a eliminate enclaves,
 - b close indentations in the urbanized area of one mile or less across the open end,
 - c link outlying enumeration districts of qualifying density that were no more than one and a half miles from the main urbanized areas

When Lange begins to make proposals for the Australian case, he immediately becomes involved in a set of rules which take some twenty-six pages of foolscap text to enunciate.¹⁶ But there is little point in multiplying detail in this context other than to point out that the situation in England and Wales is the least satisfactory, for urban areas are defined purely in legal, administrative terms (county boroughs municipal boroughs urban districts) and the identification of conurbations is even less satisfactory, for though there is a vague background to ideas concerning circulation and association, the actual limits are arbitrarily identified and based on informed local opinion.¹⁷ All this indicates that extreme caution is needed when examining figures which purport to show a percentage of the population called 'urban' and that most solutions to this difficult problem are based on a series of empirically derived regulations.

(ii) *The use of population densities* K. G. Grytzell¹⁸ has presented a

¹⁶ G. J. R. Lange (1965), 64-90.

¹⁷ Registrar General Census of England and Wales (1952) *London and five other conurbations* (London).

¹⁸ K. G. Grytzell (1964) 'The demarcation of comparable city areas by means of population density' *Lund Stud. Geogr., Series B Hum. Geog.* 25.

method which can be used in comparative studies and is based on population densities alone. He argues that fair comparisons can only be made when the densities involved are similar. He therefore attempts to delineate areas, using the smallest administrative unit, where minimum densities can be equated. He identifies these smallest units and calculates their population densities. He then works outward from the large city until points are reached where the densities fall below a given figure, say 100 per km². Although a degree of generalization is involved, this process allows a line to be drawn around the city so that all areas with a density which is over the given figure are included. For convenience sake Grytzell terms this, if it were determined in relation to London, London 100. In fact, in south east England the continuous area most easily defined is bounded by a lowest density of 104.9 per km², thus he calls London 104. He then argues that this area contains a total population that can be meaningfully compared with that of a similar density ring of 104 per km² which can be drawn around say Stockholm or Copenhagen. A series of rings of different density values can be identified and used in this way for comparative purposes. This overlaps with the formal definitions in relying on population density as a criterion and although interesting is no solution to the problem.

The two procedures which have been outlined above do not successfully separate urban from rural (nor are they primarily intended to do so), but they clearly do bear a significance for the measurement of urbanization when it is defined either as the proportion of the population living in towns or in towns of a given size. The intention of these procedures is to enable meaningful statements to be made in this context. It is evident that at the moment they are far from satisfactory.

b The process of urbanization

The second and more fundamental question that arose from the first part of this chapter concerns the process of urbanization, for it is essential to define and understand the nature of this process as a preliminary to any further investigation. Lampard argues that there are 'three concepts of urbanization which have currency in the social sciences: the behavioural, the structural and the demographic'.¹⁹ The first of these is concerned with the experience of individuals over time and with patterns of behaviour, the second is related to the activities of the whole population and is primarily related to changes in economic structure, the third is the demographic concept where the process is

¹⁹ E. E. Lampard (1965) *Historical aspects of urbanization*, chapter 14 in P. M. Hauser and L. F. Schnore, editors (1965) *The study of urbanization*, 519-20 (New York)

seen primarily as one of population concentration. All three of these throw a different light on the process and each one presents particular problems. A brief review will give some insight into the urbanization process.

The first of the three is perhaps the most well known and is usually related to Louis Wirth's seminal paper 'Urbanism as a way of life'.²⁰ Rejecting simple measurements of size, density and occupational structure or administrative status as denoting anything fundamental, largely on the bases which have so far been outlined in this chapter, Wirth formulated a theory of urbanism based on existing knowledge of social groups. The size of the aggregated population will affect relations between members, increasing the process of differentiation which ultimately leads to segregation. 'The bonds of kinship, of neighbourliness and the sentiments arising out of living together for generations under a common folk tradition are likely to be absent, or at best, relatively weak in an aggregate, the members of which have such diverse origins and backgrounds. Under such circumstances competition and formal control mechanisms furnish the substitutes for the bonds of solidarity that are relied upon to hold a folk society together'.²¹ Urban dwellers meet in segmented roles and face to face relations are impersonal and superficial. In consequence of the 'superficiality, the anonymity and the transitory character of urban social relations'²² the individual becomes alienated from his folk or rural background, a sense of belonging to an integrated community is no longer held and this leads to the state of 'anomie', of being lost in the lonely crowd. Density also adds to diversification and gives rise to characteristic urban contrasts of wealth and poverty. In addition the close living together and working together of individuals who have no sentimental and emotional ties fosters a spirit of competition, aggrandizement and mutual exploitation. Formal controls are instituted to counteract irresponsibility and potential disorder. Without rigid adherence to predictable routines a large compact society would scarcely be able to maintain itself. The clock and the traffic signal are symbolic of the basis of our social order in the urban world'.²³ But diversification means heterogeneity and this breaks down caste boundaries and gives the individual a fluctuating status determined by his own ability and effort rather than by his birth. A social role is not given to the urban dweller by the social order into which he is

²⁰ L. Wirth (1938) *Urbanism as a way of life* *Am. J. Sociol.* 44. For an extended critique see R. N. Morris (1968) *Urban sociology* (London).

²¹ L. Wirth (1938) 11.

²² L. Wirth (1938) 12.

²³ L. Wirth (1938) 16-17.

born, rather, it is achieved and during this process a series of different roles will emerge, the result of his relations with fellow workers, with managers, with officials. This can lead to a state of role confusion where the various parts to be played will conflict.

The consequences of the above rural urban contrasts have been described as a 'rural urban dichotomy'. There are two ideal constructs of the social situation, one urban, one rural—hence the generic name, 'theories of contrast'. Redfield,²⁴ basing his argument on work in Mexico, introduced a further element by suggesting that these two opposites were but polarizations of a successive pattern of change through which the folk society became urbanized. He therefore introduced the notion of a 'folk urban continuum' and contended that the epitome of the urbanization process was a transformation of the social situation of the individual in relation to the trends outlined above.

These ideas have generated a very large literature. No sooner are they eroded by criticism than they are once more revived. Thus for example Ronald Frankenberg in his study *Communities in Britain*,²⁵ published in 1966, after examining a number of separate pieces of social research, proceeds to align them along what he terms a 'morphological continuum', and develops 'a theory of social change, a progressive and historical development from rural to urban, mediated by industrialization, division of labour and role differentiation'.²⁶ This means that the urban dweller is in terms of role theory—'role confused', 'in terms of Durkheim's division of labour—"anomic", in terms of Marxian proletarianization—alienated'.²⁷ Frankenberg then isolates and lists twenty five themes in which this urban rural dichotomy is revealed.²⁸

Criticism of these ideas has been continuous since they were first put forward, yet their survival alone suggests that there is much of value in them. It is true that they maintain something of the earlier idea of the 'noble savage' and of even earlier preaching against the evils of the 'cities of the plains'. But most modern objection is associated with the fact that in extra-western areas large cities are found to be without the consequences set forth by these writers and that this transformation of social values is not a universal process but solely one related to a particular cultural context. The city must be considered as a dependent not an independent, variable, that is, the urban

²⁴ R. Redfield (1941) *The folk culture of Yucatan* (Chicago).

²⁵ R. Frankenberg (1966) *Communities in Britain: social life in town and country* (London).

²⁶ R. Frankenberg (1966) 275.

²⁷ R. Frankenberg (1966) 276.

²⁸ R. Frankenberg (1966), 285-92.

process in this circumstance is dependent upon the larger social or cultural order in which it occurs and does not operate independently of that order. Likewise it is argued that any theory of change implies that these processes have operated historically. Early urbanization should have entailed the same transformation yet Sjöberg has demonstrated that this was not so.²⁹ It is apparent that these ideas of social change have too much relevance to be rejected although they cannot be accepted as universal or as defining and explaining alone the urban-rural break. One of the real problems is that the whole concept is reductivist and is not amenable to quantitative evaluation. The relevance of the rural-urban continuum thus becomes a matter of assertion rather than of proof. As Miner³⁰ pointed out, Redfield stated his argument in such a way that there was neither a clear measure of the variables nor of their relation one to the other. No scientific testing was therefore possible.

The second interpretation of urbanization is economic and relates to 'the movement of people out of (agricultural) communities into other and generally larger non-agricultural communities. This conception gives primary recognition to the differential ordering of occupations within a given territorial space'.³¹ The crux of this approach is a direct correlation of economic development with urbanization and it is usually couched in the form of the identification of phases of economic development each of which is associated with a degree of urbanization. Many interpretations of urban origins are set out in this way. Childe,³² when discussing this subject in *The urban revolution*, postulates a number of features which distinguish the new towns from the older settlements and foremost among these is the beginning of specialization in economic activity. No longer had craftsmen to be itinerant and by virtue of their skill detach themselves from the group. By the use of the surplus of production they could become a specialized section of the new urban society. The emergence of an administrative class (made up of king and priests), the keeping of records, the development of the arts, the extension of trade and the localization of special skills are all part of the same urban process. Urbanization is seen therefore as a product of increasing economic specialization and advancing technology. The only way it is possible to advance from a subsistence basis is by specialization of economic activities. The linkages between specialisms necessitate the accumulation of people and this is the process of urbanization.

²⁹ G. Sjöberg (1960) *The pre-industrial city* (New York)

³⁰ H. Miner (1952) The folk urban continuum *Am. sociol. Rev.* 17, 529

³¹ W. W. Lampard (1965) 520

³² V. G. Childe (1950) *The urban revolution* *The Planner* 21, 3

Two examples of this form of analysis can be considered briefly. The first of these was developed by Brian Berry who proceeds from the assumption that 'associations exist between the level of economic development of a country and the degree to which the country is urbanized'.³³ A principal component analysis using 43 indices for 95 countries revealed that four factors accounted for 90 per cent of the variance. In many ways this was hardly surprising for Berry puts into his matrix variables which are essentially economic or demographic in context and in some cases almost tautologous. Thus, railroads per unit area in kilometres and also per capita are used as well as roads and motor vehicles also per unit area and per capita. Other variables relate to foreign trade, exports and energy consumption. There is a range of demographic variables, including population density and birth and death rates. In unsophisticated, perceptive terms, the variables are associated in nature. That his components are economic or demographic in nature and only a few account for a large proportion of the total variance was determined at the outset of the exercise. The first of the components was related to technology since it was associated with transport, communications, trade, energy production and consumption, national product and public services. The second factor was termed demographic. These two components were associated in the evaluation of a scale of economic development when they showed a high positive correlation with urbanization. This led Berry to support Lampard's view that 'city growth is simply the concentration of differentiated but functionally integrated specialisms in rational locales'. The modern city is a mode of social organization which furthers efficiency in economic activity.³⁴ This argument in turn is developed in an evolutionary context and Berry parallels this idea with Rostow's 'stages of economic development'.³⁵

The second study under this heading is that of Leonard Reissman,³⁶ who develops an extended critique of most theories of urbanization but when he proposes his own organizing theory it is much in the same vein as that developed by Berry. However, he applies his ideas to the industrial city only, thereby excluding 'all earlier cities—the medieval city, the city of antiquity, the Sumerian city' because the industrial city was a radical break from earlier urban history.³⁷

³³ B. J. L. Berry (1962) Some relations of urbanization and basic patterns of economic development in F. R. Pitts ed. (1962) *Urban systems of economic development* 12 (Eugene Oregon).

³⁴ E. E. Lampard (1955) *The history of cities in economically advanced areas* Econ. Devel. cult. Change 3, 92.

³⁵ W. W. Rostow (1963) *The stages of economic growth* (Cambridge).

³⁶ L. Reissman (1964) *The urban process* 16 (New York).

³⁷ L. Reissman (1964) 207.

Four urbanization variables are put forward as parts of his theory of urbanization. The first is 'urban growth' itself and this is measured by the percentage population in cities of over 100,000. The second is 'industrialization' which, he argues, 'applies to the whole process of change and its accompanying consequences, as a society moves from an agricultural to an industrial economy, from a small, rural homogeneous society to a large, metropolitan, heterogeneous massing'. This is measured by the percentage of national product derived from manufacturing. But technical change does not occur other than in a sympathetic social climate, in particular it does not occur without the 'human catalysts' to set it going. Consequently the third variable is an attempt to assess the restructuring of power relations within a society so that the move to industrialism can begin. The actual criterion used is the emergence of a middle class measured by per capita income. The last variable is the rise of nationalism—'a pivotal element in the social transition being analysed' for it 'supplies the ideology that can command loyalties, motivate action and legitimate the changes to be effected'. This is measured by the percentage of literacy among the population over the age of fifteen.

A ranking of the countries of the world on each variable is constructed and each is broken into quarters. These quartile positions are then used to construct a typology of 'countries at different stages of urban industrial development, but also to emphasize the sequence countries follow in that development'.²⁶ Reissman argues that it is evident that not all countries move in the same direction or in the same manner to urbanization, some countries begin with industrialism but others experience city growth first and industrialism follows. Other countries begin the process by the creation of nationalistic ideologies and then move to urbanization and industrialization. Reissman therefore presents a typology of urbanization couched in developmental terms (table 2-4).

This is wider in scope than Berry's analysis and attempts to achieve a larger significance than is implied by the restrictive context of Rostow's 'stages of economic development'. But at root it is an economic study in spite of Reissman's argument that it is primarily social. It is constructed around the concept that cities are 'the centres of specialized economic activity' and it seems far too optimistic to believe that the whole of the transformations discussed by Wirth and Redfield can be subsumed under the heading 'industrialization' and measured by percentage national product from manufacturing. Reissman's 'theory' then falls short of his claims but is a useful attempt to broaden the

²⁶ L. Reissman (1954), 209

table 2-4 The urban process *After L. Reissman (1964)*

Stage I	Underdeveloped societies Nationalizing societies Industrializing societies Urbanizing societies	e.g.	Congo Turkey India Egypt
Stage II	Transitional societies Industrial societies Unbalanced urban societies		Mexico Greece Panama
Stage III	Urban transitional societies Rural balanced societies Urban industrial societies Industrial balanced societies		None Ireland Italy France
Stage IV	Unbalanced metropolitan societies Metropolitan societies		Chile USA UK

limiting disciplinary lines along which discussion of urbanization has often taken place

The third interpretation of the urbanization process is termed by Lampard 'demographic', in the sense that it postulates that urbanization is a process of population concentration. 'Ecological' would seem to be a much more acceptable term for 'demographic' carries inferences of a different character. Urbanization is seen as 'the organizational component of a population's achieved capacity for adaptation. It is a way of ordering a population to attain a certain level of subsistence and security in a given environment'.³⁹ In this a given factor is the level of technology which is itself a part of social organization so that there are four variables, population, environment, technology and social organization by which the process of urbanization is said to be explained. Three of these ideas bear a relationship to those put forward by Reissman.

Population	⇒ Urban growth
Technology	⇒ Industrialization
Social organization	⇒ Emergence of middle class

It is only in the stress on the environmental control that Lampard's scheme is more apparently ecological, but even so, one might well equate that with the rising political control which makes it feasible and complete the association with Reissman's nationalism. Lampard further proceeds to develop four major phases in urbanism.⁴⁰

³⁹ E. E. Lampard (1955) Historical aspects of urbanization *Econ. Devel. cult. Change* 3: 520-1

⁴⁰ E. E. Lampard (1955) 523

- 1 Primordial the first achievement of incipient urban organization as an additional and more productive mode of collective adaptation to physical and social environment
- 2 Definitive the culmination of primordial tendencies—an alternative form—the city This can be divided into two phases
- 3 Classic constraints and circumstances moderate growth—systemic or built-in social checks and balances
- 4 Industrial Restraints are relaxed with unprecedented population concentration

These in turn bear some relationship to the 'types' presented by Reissman

At this stage it is perhaps appropriate to introduce the proper demographic correlate with urbanization as envisaged in the so-called demographic cycle. This postulates that any population will show increase in the form of a sine curve and that this is as true of the fruit fly *Drosophyla*, with which early experiments were carried out, as of a human population. An initial stage of high birth rate balanced by a high death rate produces a stationary population. Technological development results in a lowering of the death rate, which is directly accessible to aggregative technical change, but the birth rate is more delicately related to personal social changes and it therefore lags and remains high. The result is a population explosion and a period of rapid increase until the birth rate responds to social forces, falls and stability is reintroduced. This cycle has broad implications since bound up with it are different infant mortality rates, age structures and the whole demographic complex. However, the demographers also introduce, as associated variables, features such as shifts in occupational structure and in urbanization.⁴¹ In this context urbanization appears as a variable dependent upon the process of demographic change. Zelinsky, in his work on population geography, inevitably finds himself closely concerned with urbanization. Thus one of the approaches to the geography of population is termed 'socio-economic', and types or stages of socio-economic development are recognized. Moreover, 'it can be argued that these categories form a sequential, evolutionary series' so that once again a process is envisaged and in this such concepts as 'occidental urban civilization' are introduced and, later, 'in the socio-economic sphere the Netherlands is an excellent example of occidental urban civilization'.⁴²

Evidently, there is some overlapping between studies in the urbanization process and in population characteristics. Nevertheless, to put all the proposals side by side would do them less than justice and would

⁴¹ W. Zelinsky (1966) *A prelude to population geography* 120 (New York)

indeed involve severe distortions. It would be inappropriate to argue a direct relation between Rostow's 'drive to maturity', Lampard's 'classic urbanization' and any stage in the 'folk-urban' continuum. The important fact is that there *are* parallel attempts to understand the process of urbanization and of the cultural, social and economic metamorphoses that take place—a whole nexus of inter-connected, inter-linked and associated features which the conventional forms of academic investigation take apart as if they were independent.

This 'taking apart' is necessary for investigation and as a means of entry into the close and indeed circular scheme of association, but the cutting in point should not be interpreted as more than that. At the same time the process has been described—but the initial impetus has not been revealed, no 'first cause' for urbanization has been identified and the views of Reissman, that such a cause can be widely varied, must be accepted. To the geographer, such speculation is of great interest although no clear answers are likely to be gained. What is of immediate relevance is that this process, so variously described, brings with it a wide range of spatial implications. If most of the analyses of process are aspatially conceived, the spatial aspects concern the geographer. Aggregation and economic specialization imply the development of spatially distributed nodes, the towns which emerge in this process, and it is to these problems that the urban geographer directs his interest, but with an awareness of aspatial processes that will cast light upon the particular spatial problems he wishes to investigate.

Before moving to the more directly local spatial aspects of urbanization, present world patterns and some of their consequences must be considered. The hard data in relation to urban growth have been admirably set out by Kingsley Davies.⁴² Consequently there is no need here for a detailed examination of fact. Table 2-5, however, will serve

table 2-5 Percentage increases in urban population 1950-1970
After Kingsley Davies (1972)

	1950-1960	1960-1970
<i>Developed countries</i>		
Cities of 3 million and over	23.4	21.2
Other cities	25.2	26.9
<i>Less developed countries</i>		
Cities of 3 million and over	38.2	41.1
Other cities	55.5	51.3

⁴² Kingsley Davies (1972) *World urbanization 1950-1970* volume 1 *Basic data for cities, countries and regions*, volume 2 *Analysis of trends, relationships and developments* (Berkeley: University of California, Population Monograph Series, 4 and 9)

to emphasize two major themes: the first is that apparently size places, as yet, no limit on urban growth, although clearly there are problems associated with bigness. Continued urbanization exacerbates those problems that are derived from the postulates of Wirth already examined. Anomie can be seen as producer of urban vandalism, delinquency and even violence, while those who opt out of the pressures of the city may do so in the context of drug taking or some other form of escape. Suburban extension precipitates the severe difficulties of the city centre, particularly those of the ghetto. Transport systems are hard pressed to meet the demands which mobility generates. Urban pollution and waste disposal become matters of real concern. Finally, the large city has been revealed as increasingly vulnerable to technical failure and especially to extreme political pressure, for manifestly this is the age of the urban guerilla.

The second theme derived from table 2.5 is that rapid urbanization and the emergence of very large cities are now characteristic of the less developed world. The simple notion that such less developed countries are now experiencing a process that went on in the industrialized countries of the West in the nineteenth century is simply not tenable. Even the rates of growth are different, for whereas for nine European countries in the nineteenth century at the time of fastest growth the average annual gain in urban population was some 2.1 per cent, at present in the less developed countries it is nearer 4.5 per cent.⁴³ It has already been indicated in a review of Reissman's analysis of the urban process (see p. 31) that industrialization is not the sole trigger of urban growth and this is particularly relevant to much of the less developed world. In many cases the most active process is the penetration of a peasant society by a capitalist system and this induces a geographic mobility without social mobility. Towns exert a psychological pull and the peasantry moves to the city seeking the products and standards presented by the new capitalist order. Again, the concentration of land ownership in a few hands and lack of locally orientated rural development provides no hold on the migrant. Political unrest and population growth itself add to the influx,⁴⁴ while the lack of changing standards means that natural increase of population remains high in the city. Thus McGee argues that 'at least one element of Western theory should be discarded when investigating the Third World city. This is the view that the city is an inducer of change'.⁴⁵ The result is that urbanization proceeds, if not without industrialization, at a pace which the industrial

⁴³ Kingsley Davies (1969) *The urbanization of the human population* in G. Breese (ed.) (1969) *The city in newly developing countries* 5-20 (Englewood Cliffs, N.J.)

⁴⁴ M. Santos (1971) *Les villes du tiers monde* 31-33 (Paris)

⁴⁵ T. G. McGee (1971) *The urbanization process in the third world*, 31 (London)

base cannot absorb,⁴⁶ and although there is a rapid and symptomatic increase in tertiary services, the consequences are extensive underemployment and unemployment. Translated into the actual and spatial manifestations in the city the process that has been outlined produces the shanty towns or bidonvilles at the margin and the extremes of poverty in the centres of the large cities.⁴⁷

This very brief foray into a very complex problem cannot claim to stand as an effective discussion of the impact of continued urbanization throughout the world. Indeed that vast question is beyond the scope of this volume and urban geography as such. What has been attempted is the more modest aim of demonstrating the critical significance of city growth to all aspects of modern life, and of indicating unequivocally the great complexity of the urban process: there is no one universal pattern of social, economic and spatial transformation. Certainly the processes operating in the less developed countries need to be treated in a separate context.

Notes on further reading

As far as definition is concerned the following should be consulted:

FREEMAN T. W. (1959) *The conurbations of Great Britain* (Manchester)

INTERNATIONAL URBAN RESEARCH (1959) *The world's metropolitan areas* (see footnote 13)

LINDE, G. J. R. (1965) The delimitation of urban boundaries (see footnote 14)

UNITED NATIONS (1969) *Growth of the world's urban and rural population, 1920-2000* (see footnote 4)

The definition of S M S A s can be referred to in:

U.S.A. BUREAU OF THE BUDGET (1964) *Standard metropolitan statistical areas* (see footnote 15)

On the urbanization process the following are a sample of the range of work which followed from Wirth's paper (see footnote 20) in 1938:

BERRY B. J. L. (1961) Basic patterns of economic development, in Ginsburg N., editor (1961) *Atlas of economic development* (Chicago)

DEWEY, R. (1958) The rural-urban continuum: real but relatively unimportant. *Am. J. Sociol.* 64, 152

DUNCAN, O. D. and REISS, A. J. (1956) *Social characteristics of urban and rural communities* (New York)

FRANKENBERG, R. (1966) *Communities in Britain: social life in town and country* (see footnote 25)

FREEMAN, L. C. and WRIGHT, R. P. (1957) Societal complexity: an empirical test of a typology of societies. *Am. J. Sociol.* 62, 61

⁴⁶ G. Rowley (1973) Urban Growth within developing countries. *Geoforum* 13, 69-74

⁴⁷ D. J. Dwyer (1975) *People and housing in Third World cities* (London)

immediately poses a developmental question—When did this hierarchical structure emerge? Moreover, if the social and economic process of rural-urban transformation discerned in the previous chapter is acceptable, at which particular point in this continuum does a hierarchical structure appear? The observation of Lukermann here has much point. 'In limiting research by methodological fiat to cross-spatial studies without temporal depth, or to wholly logical-analytical studies without empirical locational reference, geographers have been successful to a large extent in creating more of a confusion of taxonomies than explanatory generalizations'.²

The attempts to derive some generalizations have been limited in scope. It was perhaps natural that Redfield should have been associated with a movement in the 1950s, which was largely written up in the journal *Economic development and cultural change*, and which considered these problems. Redfield and Singer were concerned with cities as centres of cultural change³ rather than of economic development. Following Henri Pirenne⁴ they put forward the notion that cities fall into two broad groups

—*Orthogenetic cities* Those cities which carry forward into 'systematic and reflective dimensions an old culture'.⁵ These are the cities of the 'Great Tradition' which translate the folk society into the urban world

—*Heterogenetic cities* Those cities where 'new states of mind become prominent creating original modes of thought that have authority beyond or are in contrast with old cultures and civilizations'.⁶

To these two contrasted sorts of city Redfield and Singer gave the names 'orthogenetic', in the sense that the city was derived from the basic unitary folk culture, and 'heterogenetic', in that an essential mixing of many traditions was involved. The first were called 'cities of the moral order', the second 'cities of the technical order'.

A further dimension was added to these postulates by the contributions of Hoselitz.⁷ Questioning the assumption that cities were always generative of economic growth—something which is generally accepted by all those writing on the urbanization process—Hoselitz argued that cities could be identified as either 'generative' or 'parasitic'. Moreover,

² F. Lukermann (1966) Empirical expressions of nodality and hierarchy in a circulation manifold. *E. Lakes Geogr.* 2, 20

³ R. Redfield and M. Singer (1954) The cultural role of the cities. *Econ. Devel. cult. Change* 3, 53

⁴ H. Pirenne (1925) *Medieval cities* (Princeton)

⁵ R. Redfield and M. Singer (1954)

⁶ R. Redfield and M. Singer (1954)

⁷ B. Hoselitz (1955) Generative and parasitic cities. *Econ. Devel. and cult. Change* 3, 278

3 THE GROWTH OF THE CITY SYSTEM

There are three closely related aspects of the urbanization process which can be distinguished for analytic purposes. These are

- 1 The aspatial social and economic changes characterizing the process
- 2 The emergence of the system of cities
- 3 The physical growth of individual cities in a 'bricks and mortar' sense

The first of these has already been considered and has been the object of a wide range of studies.¹ The third will be considered later and again there is an ample literature. But the emergence of the city system has in relative terms been neglected particularly in its general aspects. There are many individual studies of the growth phases in particular areas² but these have not been considered as part of a study looking for the universal in the same way as the folk-urban continuum was conceived. This has possibly resulted from the fact that central place theory has pre-empted the attention of many enquirers who might otherwise have turned to this problem. Effort has been directed towards increasing the elegance of the mathematical statement of central place theory and this has been accompanied by its increasing divorce from reality. At the same time, Christaller's ideas have been eroded so that from the concept of a theory of the location of towns, they have been diminished to one of the location of tertiary services and accordingly have directed work towards the contemporary structure of these services and their correlation with other aspects of the economy. But the very acceptance of the observed fact, derived from empirical investigation, that towns can be ranked into levels in a hierarchy, or indeed have any general relation one to another in a systematic way,

¹ For a single convenient source see P. M. Hauser and L. F. Schnore, editors (1964) *The study of urbanization* (New York), and for an extensive review see L. Reussman (1967) *The urban process* (New York).

² For example see N. Glazeb and A. T. Brown (1967) *A history of urban America* (New York). J. R. Borchert (1967) *American metropolitan evolution* *Geogr. Rev.* 57, 301. For a consideration of some theories of urban growth see F. Stuart Chapin (1964) *Selected theories of urban growth and structure* *J. Am. Inst. Plann.* 30, 51.

contrasted situation was proposed in the dominance of the primate city Berry turned to this problem in a statistical exercise in which he measured economic development on a multivariate basis, and concluded that 'primacy as measured by the importance of a single primate city tends to decline as one ascends the developmental scale, and as the size of the country increases'¹³ These ideas lead directly to the situation postulated by Hoselitz, who maintained that 'a comparative analysis of the central places might show the degree to which a rationalized western system of economic organization and activity has penetrated a given country and might be a fairly good measure of the breadth on which the economic development of a country has taken place'¹⁴ And again Hoselitz writes, 'The development of a given system of cities is related to processes of economic growth such a theory is as yet non-existent but it is possible that further study and refinement might lead to one'¹⁵ The same idea is implicit in Berry's study of urban development in the Ashanti area of Ghana¹⁶ although nowhere does a detailed study of the processes of development precisely depict the stages of change

Linsky devoted a paper to testing a set of hypotheses concerning primate cities¹⁷ but apart from a strong negative relation with areal extent of dense population, the degree of association with the other variables 'was disappointingly small' He concluded that the 'concept of development [of primacy] implies an historical process It suggests the need for studies systematically relating changes in degree of primacy with changes in the social, economic and geopolitical conditions within countries'¹⁸

It is apparent that little progress has been made towards explanatory generalization in this area of investigation, possibly because open enquiry is hampered by the necessity of deploying a central place scheme at one end of economic development and a primate city scheme at the other, in spite of the fact that analyses have shown this to be inappropriate

The actual process by which the city system is built up, however, is an area of enquiry which appears to offer a fair possibility of generalization once these inhibiting conditions are removed In most cases it can

¹³ B J L. Berry (1962) Some relations of urbanization and basic patterns of economic development. In F R Pitts editor (1962) 12

¹⁴ B Hoselitz (1955)

¹⁵ B Hoselitz (1955)

¹⁶ B J L. Berry (1962) Urban growth and the economic development of Ashanti in F R. Pitts, editor (1962), 53

¹⁷ A. S. Linsky (1965) Some generalizations concerning primate cities *Ann Assoc Am Geogr* 55, 506

¹⁸ A. S. Linsky (1965) 511

economic generation or parasitism, he contended, did not simply go hand in hand with cultural change. The result is a complex cross-classification. As an example of economic parasitism Hoselitz quotes the European colonial cities in Africa and in Latin America. They were centres for the extraction of wealth alone and were, therefore, initially not generative of development. This led him to suggest two elements in the urbanization process:

- 1 *Primary urbanization*. Here the peoples who make up 'the pre-civilized folk more or less share a common culture which remains the matrix for the urban culture which develops from it.'⁹
- 2 *Secondary urbanization*. By this the folk society is further urbanized through contact with peoples of different cultures and thus leads to a weakening or supercession of the local and traditional cultures by states of mind incongruent with those of local cultures.¹⁰

There is a clear parallelism in these ideas and those of Redfield so that

primary urbanization = orthogenetic
secondary urbanization = heterogenetic

But these do not simply fit in with the generative-parasitic contrast in that parasitic colonial cities were heterogenetic and thus a part of secondary urbanization. Similarly orthogenetic cities, in attempting to preserve the local culture, can become resistant to change and hence parasitic.

The next stage in these arguments sees the city system as the product of the progressive change from one sort of urbanization to the other. It is in this context that the early paper by Mark Jefferson, 'The law of the primate city'¹¹ has been revived. Jefferson suggested that the largest city shall be super-eminent, and not merely in size, but in national influence.¹² On an intuitive level there is an association of the dominance of the whole economic, social and political scene by one city with 'The Great Tradition' and therefore with primary, orthogenetic cities. This situation has clearly perplexed research workers on central place theory. Not only was there the problem of the way in which such a city system as envisaged by central place theory had emerged, if the concept has any meaning other than as a purely static and unreal postulate, but further, an observed and

⁹ B. Hoselitz (1955).

¹⁰ B. Hoselitz (1955).

¹¹ M. Jefferson (1939). 'The law of the primate city' *Geogr. Rev.* 29, 227.

¹² M. Jefferson (1939). See also Clyde E. Browning (1962). 'Primate cities and related concepts' in F. R. Pitts (ed.) (1962). *Urban systems and economic development* 16 (Eugene, Oregon).

is a haphazard system of towns, 'rotten boroughs' and 'ancient cities', with important administrative but negligible economic functions, and large 'urban areas' important economically but not otherwise. Further developments result in a sorting out of this situation, mainly, but not solely, in economic terms, though nearly all countries show that this sorting is far from complete. This analysis is in line with that of Guttenberg who argues that transportation is the means by which the distributed features become 'undistributed' or related to a different ordering principle. Transportation decisions 'will result in a constantly changing structure with the emphasis shifting along the continuum between the situation with highly distributed centres to the situation with one major undistributed function'.²² Lukermann argues in a similar way, identifying three elements in urban systems analysis: hierarchy, nodality and circulation. Nodality is identified as 'a behavioural act of man, not simply a geometric point or a circulation intersect. In behavioural terms a nodal location is that place where the individual has the greatest freedom to interact. Such a definition involves both population density and areal accessibility, as well as functional availability. Expressed in locational terms, nodality and hierarchy are conceptually analogous. A spatial hierarchy is the specification of a nodal system'.²³

In the above 'the greatest freedom of the individual to interact' is very near to many of the ideas in the aspatial concepts of the process of urbanization already considered in the last chapter, and the two aspects are thus brought together. The generalized pattern is revealed as a series of isolated centres being brought into interaction through the operation of the circulation manifold and from that interaction a hierarchical situation appears.

This is in line with the present author's work in Wales.²⁴ There the Anglo-Norman conquest introduced the castle town or bastide into a non-urbanized folk society where the move towards urbanization was but incipient. There was no primary urbanization, no epitome of the folk culture, but only secondary urbanization and this created a series of military centres isolated amid an alien population and in an area of fragmented topography. But with the breakdown of isolation through the increase of transport facilities, differentiation became apparent. At first, this is represented in administrative terms, for government was the prime urban function and a hierarchy of administrative centres emerges, but one clearly reflecting the older

²² A. Z. Guttenberg (1960) 109

²³ F. Lukermann (1966), 22

²⁴ H. Carter (1965) *The towns of Wales, a study in urban geography* (Cardiff) H. Carter (1970) *The growth of the Welsh city system* (Cardiff)

be argued that at an early stage in the development of a city system, the competition and interaction between the centres, which is postulated as a necessary condition of central place systems, did not obtain. What did rule was the principle of separation whereby each centre served a surrounding area but lack of communications prevented competition and each centre was at a similar level. Guttenberg has characterized this as a situation with 'distributed facilities',¹⁹ that is, where the various urban facilities are distributed according to population in a system where little interaction takes place. This same situation has been envisaged by Webb²⁰ who postulated two theoretical viewpoints under which the phenomena of urban function may be developed. These he termed 'isolated urban society' and 'integrated urban society'. In the first, there are differentiated functions but no contact, in the second, full communication and free exchange of goods. As an example of the first condition, Von Thunen's isolated city is used and it is suggested that if this is cut off from all others then each city would of necessity duplicate the same services, all other things being equal. Attempting to cite an example, Webb takes up pre industrial western society and maintains that 'existing in comparative isolation one from the other, there was often little contact of economic significance between the urban places of medieval Europe'.²¹

But even if economic organization was rudimentary, there was still a need for political and administrative control which in a 'pre industrial' stage was usually dominant over economic relations. This political control was often exercised from a single centre which was the epitome of the folk culture and which thus attained a pre-eminence above a multiplicity of cities of the same low order, that is, it occupied a primate position. But economic development the thickening of the whole web of economic activity which accompanies the process of urbanization, together with advances in communication techniques, led to interaction between these distributed points and to the possibility of a selected few being vested with higher order services by virtue of their nodality. At this point one can revert to the ideas of primary and secondary urbanization. It is possible that this move towards discrimination between centres had already been partly anticipated by the creation of a hierarchy of administrative centres related to the primate capital and the two emergent town systems, one based on economic activity, the other on political organization, do not mesh. The result

¹⁹ A. Z. Guttenberg (1960) Urban structure and urban growth *J. Am. Inst. Plann.* 25, 104.

²⁰ John W. Webb (1959) Basic concepts in the analysis of small urban centres of Minnesota *Ann. Assoc. Am. Geogr.* 49, 55.

²¹ John W. Webb (1959), 56.

outlined above. In this context the 'primate situation' is not regarded as inherent in the scheme: at no time in Wales has there been a primate city. It is, however, interesting to speculate that the tendency to equilibrium which is envisaged in the climax phase need not lead to a situation exclusively hierarchical in terms of the definition given above, and depending upon economic and cultural conditions one could envisage the process leading to an arrangement in accord with either the 'law of the primate city' or the 'rank size rule'. This would depend on the exact nature of the interaction between primary and secondary urbanization and between the developmental sequence outlined above. The aim here is not to postulate an abstract but unreal situation but to generalize the processes that have produced the wide range of variant conditions which now obtain. The failure of an orthogenetic city to emerge in Wales and the complete dominance of secondary urbanization is simply revealed in the fact that Wales had no capital city until 1955 when the opposition of the folk-culture was finally overcome by the reality of the present economic situation.

Some problems associated with the outline proposed above are

- 1 The structure is essentially teleological and implies a concerted movement towards the present, which is a static, ultimate achieved situation. In this sense however there is envisaged only a tendency towards such a condition which is perpetually changed by minor as well as major exogenous influences brought to bear on the system, which is, therefore, in a constant state of adjustment partly to major genetic forces but also to subsidiary and minor forces.
- 2 This 'constant state of adjustment within the city system' seems at odds with a 'tendency towards equilibrium'. Equilibrium is interpreted as a condition where the rank order of towns remains constant so that a transition phase is envisaged as one of rapid and extensive rank-order change. This is gradually worked out of the system and change becomes much less. Equilibrium would be the stage, therefore, where size relations between all the towns remain constant, a position towards which the system tends but without attaining it.
- 3 The statements in the above paragraph introduce many of the problems which arise when the development of a city system is considered in the context of size and spacing of the constituent towns. This includes the hypothesis that regularity will increase with time and that competitive processes can be inferred from the regularity of a dot pattern.²⁵ These notions however, must be

²⁵ A. R. Cox (1969) The voting decision in a spatial context *Prog. Geogr.* 1, 84-6

military situation rather than the newer evolving economic one. The result is a period of transition or change until, by the end of the eighteenth century, a sorting out has taken place and a discernible 'economic' hierarchy is present. It is possible to epitomize this process in the form of a developmental model (table 3.1).

table 3.1: Proposed phases in the development of a system of cities

<i>Stages</i>	<i>Dominant spatial principles</i>	<i>Rank relations</i>
1 Genesis of unfunctional settlements	Separation and creation of nodes	Locally based
2 Transition and acquisition of varying functions; build up of the functional mix	Interaction and competition between the nodes; increasing transport efficiency	Rapid fluctuations in rank
3 Cf. maximum balanced array of functions	Integration of the nodes into a system with a tendency towards equilibrium	Rank relations remain constant

It is clear that this process of development is seldom uninterrupted and complete, and any nation or area can go through the same process more than once. Thus in Wales a degree of equilibrium had barely been attained before the beginnings of iron working and coal mining in the mid-eighteenth century (or, to put it another way, the beginning of the Industrial Revolution) resulted in the generation of a whole new series of unfunctional settlements. The mining village is the epitome of the unfunctional 'node' dominated by the principle of separation. But interaction was now quicker and the patterns of circulation exercised a discriminatory influence on these nodes, creating the degrees of nodality which have resulted in a hierarchical arrangement of contemporary centres, that is one where towns can be ascribed to fairly clearly stepped grades or ranks. The present urban system of Wales is a complete mix, resultant from the partial integration of two phases of development, neither of which has been completely consummated, worked out in terms of contemporary technological, economic and social characteristics. But if the complexity be disregarded, then the basic sequence can be understood in the terms

For various studies of the growth of cities in underdeveloped countries see

BREESE, G (1969) editor *The city in newly developing countries* (Englewood Cliffs, N J)

The paper by Berry should also be consulted

BERRY, B J L (1961) City size distributions and economic development
Econ Dev and Cult Change 9, 573

Other papers are

BELL, G (1962) Change in city size distribution in Israel *Ekistics* 13, 103

DZIEWONSKI, K (1964) Urbanization in contemporary Poland *Geog Polonica* 3, 37

MADDEN, C H (1956) Some spatial aspects of urban growth in the United States *Econ Dev and Cult Change*, 4, 386

MORRILL, R L (1966) Migration and the spread and growth of urban Settlement *Lund Stud Geog Ser B, Hum Geogr* 26, 183

The whole problem of growth which this chapter initiates has been taken up and considered at length in a volume which advances the elementary introduction here

ROBSON, B T (1973) *Urban growth an approach* (London)

For an introduction to a contrasted approach see

SWANSON, J A (1975) Urban concentration and structural change the American Middle West, 1850-1930 *Urban Studies* 12, 309-14

held over until the ideas of central place theory have been reviewed (see chapter 7)

- 4 The outline given above of the development of a city system has a little in common with the more universal interpretation presented by Lampard in the context of human ecology²⁶ which has been introduced in chapter 2. To some extent what he terms 'primordial urbanization' is associated with the early foundation of centres in Wales, 'classic urbanization' with the degree of equilibrium attained by the eighteenth century and industrial urbanization with the complete refashioning which took place after 1750.

This chapter has attempted to examine some ideas on the growth of the city system and to put forward the view that certain generalizations can be made. These are not pre-judged by the supposition of an 'ultimate' situation in conformity with central place theory or any other theoretical standpoint, but are derived from the empirical consideration of the development of the system of cities. It is certain that no finite statement can be made on the development of city systems and that here there is a field for further investigation. Interest has only slowly moved towards these studies but it is now fairly widely accepted that in the growth process in locational terms a further dimension of understanding is added to the whole complex of urbanization and is a contribution which the geographer is particularly equipped to make.²⁷

Owing to the need to think of the emergence of the system of cities as an integral part of the urbanization process we have to some extent run ahead of ourselves. A position has now been reached where before further progress can be made a more precise analysis of the factors which control the location of towns must be introduced. To this the next chapters turn, first looking at the nature of urban functions before considering problems of town status. We shall then be in a more favourable situation to consider the size and spacing of cities in the context of urbanization and the growth of the city system.

Notes on further reading

There are few empirical studies expressly concerned with the growth of systems of cities but of these the one which is worth attention is

LUKERMANN, F. (1966) Empirical expressions of nodality and hierarchy in a circulation manifold (see footnote 3)

See also

CARTER, J. (1970) *The growth of the Welsh city system* (see footnote 24)

²⁶ E. Lampard (1964) *Historical aspects of urbanization*. Chapter 14 in F. M. Hauser and L. F. Schnore, editors (1964), 519-54.

²⁷ E. Lampard (1964), 523.

not directly related to it. This involves a separation which is artificial but necessary, and most enlightenment will be derived from a separate study of resource-orientated functions and other activities whose locations central place theory cannot explain and the subsequent superimposition of such functions and activities on to the areal pattern of central places.³

It also follows that if a town owes its being, or its growth, to such specialized or resource-orientated functions, the complete investigation of the nature and degree of specialization is essential for the light it will throw on three related aspects of urbanism. These are

- 1 The urban role in the national or regional economy,
- 2 The particular aspects of urban society which correlate with types of specialism,
- 3 The relation between function and locational patterns which is at the heart of the geographer's interests

The procedure for this investigation has been based on processes of classification. 'In the earth sciences, as in the astronomical ones, the most notable advances are almost invariably associated with the construction of a theoretical model which, in a particularly symmetrical and harmonious manner, seems to embrace a large section of observed reality'.⁴ Such model building characterizes central place theory, but in the analysis of specialized functions such a procedure is hardly developed. The construction of models often 'results from a backlog of accumulated information although every such accumulation does not inevitably lead to such a construction and attempts are made then to digest the material by means of classifications rather than by integrated models'.⁵ Further 'scientifically, classification is of the utmost importance because of the empirically established fact that it is possible to set up certain classes in such a way that mere membership in the class renders highly probable the possession of attributes other than those needed to define the class'.⁶

Criticisms of such procedures have been made by numerous writers mainly on the grounds that most functional town classifications are seen as isolated exercises having no theoretical basis and often little practical purpose for classes distinguished are not shown to have other associated attributes. Nearly all these critics having made these points put forward their own classificatory system often without meeting the

³ W. Isard (1960) *Methods of regional analysis* (New York) 227

⁴ R. J. Chorley (1963) Diastrophic background to twentieth-century geomorphological thought. *Bull. geol. Soc. Am.* 74, 933

⁵ R. J. Chorley (1963)

⁶ M. Cohen and E. Nagle (1934) *Introduction to logic and scientific method* (London)

4 URBAN FUNCTIONS AND THE FUNCTIONAL CLASSIFICATION OF TOWNS

Any advance which is made from a self-contained subsistence economy can only be effected by specialization. In this context, the town is a point of specialized activity carrying out tasks which are best performed either at central, accessible places or where a high degree of population concentration is economically necessary. The former can be regarded as co-ordinating activities, the latter as productive. A third activity can be added to these, that of the organization of the intermediary, long distance transport, so that the following can be regarded as characteristically urban functions¹

- 1 Central place functions, or general services, which are carried out for a more or less extensive but contiguous area,
- 2 Transport functions, which are carried out at break of bulk points along the major lines of communications,
- 3 Special functions, which are carried out for non-local, non-contiguous areas. These could include extractive and manufacturing industries with world wide markets or indeed minor industries whose distributive areas are smaller than the general service area.

It is often stated that the essence of urban character is service for a tributary area and the study of central place functions has become a highly developed and specialized field which will be dealt with in the next chapter. But problems arise if such central functions are not clearly seen in their relation to the other two types described above. This is simply apparent in the consideration of the population total of a town which is an unsatisfactory measure because it is inclusive and indivisible. It in no way measures the centrality of a town in relation to the surrounding countryside and Christaller was at pains to distinguish between the importance of a town which could be measured by its population size, and centrality, which required a different and more appropriate measure². Before centrality can be considered, therefore, it is necessary to consider those aspects of a town's activities which are

¹ V de Chauncy D Harris and E L Ullman (1945) *The nature of cities* *Ann. Am. Acad. pol. soc. Sc.* 242-7

² W Christaller (1933) *Die zentralen Orte in Süddeutschland* (Jena) translated by W C Baskin 1966 *Central Places in Southern Germany* (Englewood Cliffs N.J.)

Since the time of this classification, attempts to suggest groups of towns linked by common functions have become more elaborate and statistically more sophisticated. At the same time, greater efforts have been made to understand the logical bases of classification and the nature of town function. It can be suggested that these attempts can be arranged in a progression from the simple general statement to the contemporary multivariate analysis. In general, this is a chronological arrangement and one in which statistical analytical tools become increasingly used.

a General description

This is the earliest stage in the analysis of town functions. Classes are established in descriptive terms only and towns are allocated to a class on a subjective basis. There are innumerable schemes of this sort appearing at the most elementary level but they all owe a great deal to one of the earliest of such classifications to appear in a geographic context. This was included by M. Auroousseau in his paper 'The distribution of population: a constructive problem'¹⁰. The scheme recognized six classes of active towns which were then subdivided (table 4-1).

table 4-1: A classification of cities After M. Auroousseau (1921)

<i>Class I Administration</i>	<i>Class II Defence</i>	<i>Class III Culture</i>
Capital cities	Fortress towns	University towns
Revenue towns	Garrison towns	Cathedral towns
	Naval bases	Art centres
		Pilgrimage centres
		Religious centres
<i>Class IV Production</i>	<i>Class V Communication</i>	
Manufacturing towns	<i>a Collection</i>	<i>b Transfer</i>
	Mining towns	Market towns
	Fishing towns	Fall line towns
	Forest towns	Break of bulk towns
	Depot towns	Bridgehead towns
		Tidal line towns
		Navigation head towns
<i>Class VI Recreation</i>		<i>c Distribution</i>
Health resorts		Export towns
Tourist resorts		Import towns
Holiday resorts		Supply towns

¹⁰ M. Auroousseau (1921) 'The distribution of population: a constructive problem', *Geogr. Rev.* 11, 563

weaknesses they have identified elsewhere, so that a very large literature has developed.⁷ Robert Smith, in reviewing this situation, puts forward two spatial characteristics that can be associated with town functions.⁸

- 1 There should be distributional characteristics of towns in similar functional classes that are peculiar to those classes
- 2 Different functional classes ought to be associated with different types of hinterland areas

This restates the point that has already been made, that any explanation of town distribution cannot solely rely on methods related to central place analysis but needs to be integrated with interpretations derived from specialized activities. The procedure lies within a long tradition and can be given a clear purpose even if it does not have a distinctive theoretical orientation.

1. SYSTEMS OF CLASSIFICATION

From earliest times, chorographical works have included descriptions of town functions and have carried the implication that towns fall into classes or groups by virtue of the functions they perform. The simple designation 'market town' or 'seaport' is a form of functional classification. With the increasing diversity of town function that followed the industrial developments of the eighteenth and nineteenth centuries, such descriptive classifications became more frequent and more elaborate. In Britain the Committee on the Health of Towns which reported in 1840⁹ found that a prerequisite of their work was some orderly arrangement of the towns to be considered. Accordingly, they proposed five groups which were

- 1 The metropolis
- 2 Manufacturing towns
- 3 Populous seaport towns
- 4 Great watering places
- 5 County and other considerable inland towns not being the seats of particular manufactures

Here the distinction is made between central place cities (5) and special activity cities (2, 3 and 4) and the variable of size is clearly included in the words 'populous', 'great' and 'considerable'.

⁷ For a convenient review of various classifications see R. H. T. Smith (1965) *Method and purpose in functional town classification* *Ann Assoc. Am. Geogr.* 55, 539.

⁸ R. H. T. Smith (1965), 546-7.

⁹ (1840) *Report of the select committee on the health of towns* (London) iv.

The conclusion, that Oxford is a resort with an important engineering sector, might have an uncomfortable element of the truth, but it is hardly the whole truth. The source of error is the substantial employment by the Oxford colleges of those in occupations grouped under 'Personal service'. This is an obvious example, but much more subtle confusions can arise and the data have to be handled with care.

Studies based on the principle of statistical description can be found in the earliest stage of urban geography¹³ as for example in Olinto Marinelli's 'Dei tipi economici dei centri abitati a proposito di alcune città italiana ed americana'¹⁴ But the most widely quoted example is that put forward in 1943 by Chauncy D. Harris in which a functional classification of the cities of the USA was outlined.¹⁵ Eight classes of towns were recognized: manufacturing, retail, wholesale, transport, mining, university, resort and retirement, and diversified. One example will be sufficient to indicate the principle used. Transport centres are defined as towns where 'Transportations and communication contain at least 11 per cent of the gainful workers and workers in transportation and communication equal at least one third the number in manufacturing and mechanical industries and at least two thirds the number in trade'.¹⁶ This example illustrates the problem of diagnosis. 'Communications' should include workers engaged in telephone and telegraph services (in Britain it includes lift attendants), and yet the class 'transport centre' seems to imply something rather more limited.

If the criteria for the definition of this town type be considered, two bases for recognition are apparent—

- 1 a certain minimum proportional employment, the diagnostic ratio, in this case of 11 per cent,
- 2 a certain degree of dominance of this group, measured by comparison with other groups

Both these criteria were set up by simple empirical means. The experience of the classifier is used to assign towns to groups which are then converted into functional classes by means of a definition which fits with a minimum degree of disturbance, that is with a minimum number of accessions or deletions. This is a logical step forward from Auroousseau's system for the groups there defined are

¹³ For a review of early work see M. Auroousseau (1924) Recent contributions to urban geography: a review *Geogr. Rev.* 14, 444.

¹⁴ O. Marinelli (1916) *Dei tipi economici dei centri abitati a proposito di alcune città italiane ed americane. Riv. Geogr. Ital.* 23, 413.

¹⁵ Chauncy D. Harris (1943) A functional classification of cities in the United States *Geogr. Rev.* 33, 86.

¹⁶ Chauncy D. Harris (1943)

Criticisms of these classes are not hard to find. There is a confusion of functional and locational terms, for example, 'tidal limit town' cannot in any way be a functional term, it is descriptive of a location which may or may not result in certain definable functions. The group labelled 'Communications' seems oddly elaborate compared with the other groups, moreover, its constitution appears open to criticism, for it includes two of the three basic types of urban activity identified earlier. 'Market towns' and 'Mining towns' are hardly of the same functional order and the promotion, at least, of the three sub-groups to major groups would seem logical and necessary.

Aurousseau's scheme, although subject to criticism, marks an important stage in the development of functional study. It brought together many diverse ideas into one comprehensive scheme which was at once the climax of a long period of purely descriptive work and the springboard for new methods.

b Statistical description

This stage in the consideration of town functions introduces objective, statistical material into the problem of classification. The most consistently used data have been occupation or employment ratios. There is a clear link between an employment group and a town's function. Numbers employed are not immediately important, but rather the proportional place which an employment group takes in the whole range of groups in the town. If mining employs 30 per cent of the total occupied population in a town, then this is a clear diagnosis of an important mining function and such figures can be referred to as the diagnostic ratios. But there are difficulties which arise in the equation of employment category and town function. The first is the obvious problem of reducing the many thousands of occupations into a limited number of significant groups.¹¹ In this process, a large number of arbitrary decisions are made, which the classifier has to accept on the principle that all his results will be similarly affected. The second major problem is that the same occupation group can mean different things in different places. To cite a simple example, in the British census the group titled 'Personal service', including hotel and café proprietors, barmen and domestic servants, is usually taken to be diagnostic of a resort function. But if the occupation structure of Oxford¹² is examined it will be found that the largest single group is 'Personal service' accounting for some 14.6 per cent of the total. The next highest group is 'Metalworking and engineering' employing nearly 13 per cent.

¹¹ A brief consultation of the volume of the 1951 census (1956) *Classification of occupations* (London) will reveal the complexity of this problem.

¹² Census of England and Wales 1951 (1956) *Occupation tables* (London).

the particular city with the average city in order to derive a critical figure. This process becomes the basis of many schemes of statistical analysis, where local conditions are compared with national average conditions. A good example of such a procedure is in the calculation of location quotients²¹ which measure the local significance of an industry by relating the ratio of its local employment to the national average.

In 1953, L. L. Pownall attempted to use this concept in a study of 'The functions of New Zealand towns'.²² The mean employment was calculated for seven different size groups of towns and then within its appropriate group a town was examined for positive deviation from the mean. 'The positive deviations from these national averages are taken here as criteria expressing the relative importance of six different functions: manufacturing, building and construction, primary industry, transport and communications, distribution and financial, hotel and personal service, administration and professional service'.²³ The seventh class, that of residential function, was based on the ratio between total population and population gainfully employed. Any town could be specialized in more than one function and a discussion of the seven classes followed. Pownall's groups are clearly too dependent on the occupational groups for 'building and construction' is a universal within which specialization is incidental rather than fundamental. Again, a residential function is far better expressed as either 'resort function' or 'retirement function' or both combined since it is not easy to distinguish them.

A more fully developed and more logical scheme is that of H. J. Nelson who in 1955 set out 'A service classification of American cities'.²⁴ Nelson poses the question, 'How large a percentage of the labour force must be employed in a particular service to make the performance of the service far enough above normal to warrant separate classification?' In his answer, he defines 'normal' as mean or average for the whole country and the degree above normal he defines by use of the standard deviation, a measure of the departure from the mean condition of any member of a series.²⁵ Diagnostic occupational groups are selected from the census returns. These

²¹ See for example West Midland Group (1948) *Commission* (London) 105.

²² L. L. Pownall (1953) 'The functions of New Zealand towns', *Am Assoc. Am. Geogr.* 43, 332.

²³ L. L. Pownall (1953), 334.

²⁴ Howard J. Nelson (1955) 'A service classification of American cities', *Econ. Geogr.* 31, 189.

²⁵ For the explanation of these methods see S. Gregory (1963) *Statistical methods and the geographer* (London).

now given precise statistical definitions. But these definitions are the result of subjective decision, and although dispersion graphs and other aids may be used, the decision is still personal.

This is clearly accepted in another classification which has some parallel features. Duncan and Reiss in their book *Social characteristics of urban and rural communities*¹⁷ include a large section dealing with 'functional specialization'.¹⁸ In this, the lowest value of upper decile or quintile groups is used as a criterion of definition, although this is varied in application. For specialization in transport, the definition is derived thus: 'Since the distributions of places by the percentage of persons employed in transport are quite leptokurtic, although positively skewed, the upper decile was taken as the criterion'.¹⁹ This gives us a ratio of between 8 and 12 per cent dependent on size, for allowance is made for different size classes in the classification, with the comment at one point that, 'the choice of the quintile as a cutting point, of course, is somewhat arbitrary'.²⁰ The name given to these sorts of classification is 'statistical description'.

c. Statistical analysis

The next step in functional classification is linked with the attempt to offset criticism of the sort directed at Harris's scheme. This means that the classes recognized have to be derived statistically from the raw material. When it is stated that an employment of 11 per cent of the labour force in transport and communication is the diagnostic ratio, then it is implied that it is only above this level that employment become distinctive when compared with other towns. Webb's contrast between 'isolated urban society' and 'integrated urban society' has already been noted.²⁰ In the first case, as in the city in Von Thünen's isolated state, specialization can only be identified and measured by comparing one employment sector in the city with another sector, in the same city, in relative terms. In the second case an employment sector can be compared with the same sector in other cities, either in absolute or in relative terms, or with the means for the whole group. In many cases methods do not clearly distinguish between these two bases of comparison and indeed in many cases they are both used but without clear comprehension of the implications.

In Harris's scheme there is an implied and subjective comparison of

¹⁷ Otis D. Duncan and Albert J. Reiss (1956) *Functional specialization of communities*. Part IV of *Social characteristics of urban and rural communities*, 215 (London).

¹⁸ Otis D. Duncan and Albert J. Reiss (1956), 244.

¹⁹ Otis D. Duncan and Albert J. Reiss (1956) 223.

²⁰ See chapter 3 p. 39 J. M. Webb (1959) *Basic concepts in the analysis of small urban centres of Minnesota*. *Ann Assoc Am Geogr* 49, 55.

the census of occupations. In addition, diagnostic ratios will vary considerably with the sample of towns taken. Thus, in Wales, the mean employment in mining is 7.7 per cent and the standard deviation 11.96 per cent so that mean plus standard deviation is 19.66 per cent, a very different figure from that for the USA given above. It might be argued that here the comparisons are not proper for the above example equates a very much larger country with but part of the United Kingdom. Even so this objection emphasizes the problem in that diagnostic ratios must be related to the particular circumstances and the character of the areas being investigated. They cannot be put forward as of universal application. International comparability is still far off.

d Urban economic base studies

These studies have developed during the whole of the period covered by the classifications reviewed and indeed, there is an overlap between the two. In practice, the studies introduce little that is very different, but there is a more extended background of principle. A review of principle could start with Chauncy D. Harris's classification already considered. Under that classification, transportation centres are defined as having 11 per cent of their gainful workers employed in transport and communications. If this is analysed, it means that Harris regards 11 per cent as the critical value at which transport employment becomes diagnostically significant in terms of the country as a whole. But this is not necessarily a useful measure, for what is required is some estimate of the point at which employment in transport becomes critical in the life of the town, not merely keeping it going but making a distinctive and generative contribution to its economic well-being. This is the essence of the concept of the 'economic base', around which an elaborate theory has accumulated²⁷ and which seems to offer at least the possibility of model building.

The earliest suggestion of the concept appears to have come in 1902, when W. Sombart in *'Der moderne Kapitalismus'*²⁸ identified a dual function in towns which he characterized as 'stadegründer', or basic, and 'stadefüller' or complementary or non basic. These concepts have come into English mainly via the work of planners, particularly in the USA. In a work published in 1928,²⁹ Robert M. Haig distinguished between 'primary occupations', or the producing of goods for external purposes, and 'auxiliary occupations', or the producing of goods and

²⁷ The most convenient source for consulting material on this topic is Ralph W. Pfouts (1956) *The techniques of urban economic analysis* (West Trenton, N. J.).

²⁸ W. Sombart (1902) *Der moderne Kapitalismus* volume 2 (Leipzig).

²⁹ Robert M. Haig (1928) *Regional survey of New York: Major economic factors in metropolitan growth and arrangement*, volume 1 (New York).

relate to manufacturing, retail trade, professional service, transportation and communications, personal service, public administration; wholesale trade, finance, insurance and real estate, mining. For each occupational or diagnostic group the standard deviation from the mean for all towns is calculated. Any town which then shows a percentage employment of more than mean plus one standard deviation is said to be significantly characterized by the function diagnosed by the occupation group. This is further developed by recording how many times the employment ratio in one town is above the mean for all towns in terms of the standard deviation. Thus, the mean for employment in mining in all urban areas of the USA is 1.62 per cent and the standard deviation (SD) is 5.01 per cent. This means that the diagnostic ratio for a mining town would be $1.62 + 5.01 = 6.63$ per cent. Degrees of specialization can now be measured by mean + twice the standard deviation ($1.62 + 10.02 = 11.64$) and mean + three times the standard deviation ($1.62 + 15.03 = 16.65$). Since the standard deviation is properly only a valid measure when distribution about the mean is normal, no more than three standard deviations are measured, so that Butte, Montana, with 32.1 per cent in mining would be characterized as M13, indicating that it is a mining town with an employment proportion over three standard deviations above the mean. R. S. Dick working in Queensland, Australia,²⁸ adopted a similar technique but expressed his results more completely by including the percentage employment as well, so that Butte would have been shown as M132⁺, indicating a total employment of 32 per cent as well as the three standard deviations above the mean. This procedure emphasizes that no exclusive classes result from this form of statistical analysis. Any town could have a number of different groups over 'mean plus standard deviation' or indeed, it could have no group over the appropriate diagnostic ratios and to meet this problem Nelson had to add a further functional class called 'diversified'. The forcing of multi-functional towns into unfunctional classes is of necessity an unsatisfactory process which Nelson and Dick avoid, but at some sacrifice of simplicity, for the purpose of classification is partly, at least, the reduction of complexity to a comprehensible form.

Two further points need to be added here. The functional classes are determined by the occupational groupings of the census. Thus, in Britain, it would be impossible to recognize, as does Nelson, a whole-sale function, for no appropriate occupational group is recognized in

²⁸ R. S. Dick (1961) Variations in the occupational structure of central places of the Darling Downs Queensland. *Univ. Queensland Pap.* 1, 2

services for the convenience of the primary group. This concept was developed, and the terminology of the economic base was introduced by Homer Hoyt in 1939.³⁰ Here the idea is propounded in its modern form. Economic activity can be broken down into two components:

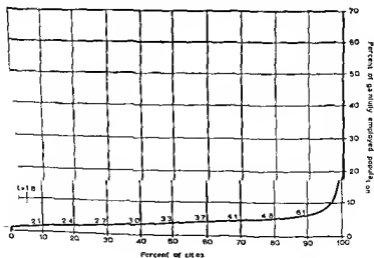
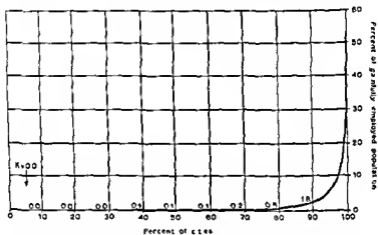
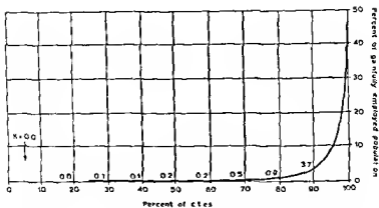
- 1 That which meets non local demand this is the contribution to the national economy Basic or city forming
- 2 That which meets local, internal demand this keeps the city going but makes no contribution to the national economy 'We cannot live by taking in each other's washing' Non-basic or city serving

It follows from the above definitions that the basic component is 'city forming' because it induces growth. It creates a centripetal flow of income into the city which is available for distribution and circulation. But some qualification is necessary. The dictum quoted in 2 above, 'We cannot live by taking in each other's washing', is only partly true. By extending the boundaries of the unit for which the economic base study is to be made, one eventually arrives at an area where there is no export of goods or services at all, at which point all activities would, by definition, be non-basic. Such a unit would be hard to find but nation states might approach the condition in varying degrees. Nevertheless within the limited unit of the city, it is argued that if it is possible to isolate the basic component of a city's economy, then we have isolated the growth-inducing or 'city forming' element. This is the obvious key to the study of locational advantages and growth, and should be the basis of classification.

The practical problem remains in the method by which this basic component is to be isolated. Hoyt himself proposed a cumbersome procedure by which local and non-local destinations of goods and services sold were determined by questionnaire, and the trade and professional population apportioned to basic or non-basic activities by using the proportion of the national income obtained by the city.³¹ Any such procedure is clumsy, unreliable and hardly practical when a large number of towns is being considered. Most methods subsequently proposed have aimed at simplification and have fallen back on the old idea of comparing local with national, particularly with mean or some other condition. The national proportion employed in any occupation is obtained and the number expected to be so employed in a town of any size is calculated. If the actual employment when compared

³⁰ See A. M. Weaver and H. Hoyt (1939) *Principles of real estate* (New York)

³¹ A. M. Weaver and H. Hoyt (1939)



based on the variable of size which is, unfortunately, later found to have little correlation with the other variables. Also this is a very much broader study of difference in which not only characteristics other than *function* are introduced, but by using changes between 1931 and 1951, a dynamic element is brought into what has been in all other classifications a static situation.

Nevertheless, the volume leads up to the last chapter entitled 'A classification of towns', and, since this is expressed in functional terms, it cannot be disregarded. The procedure is that a correlation matrix is established by using the product moment correlation coefficient³⁹ for all the variables taken in pairs.

It follows on *a priori* grounds that there is likely to be some systematic variation, but in this complexity dependent variation will not be a fruitful line to follow—hence the need to evaluate independent variation or 'the relationship of a set of variates among themselves no one being selected as special'. The investigation now leads to a study of how much of the total variation can be accounted for by a small number of independent variates, called components. These are purely mathematical artefacts, not individual members of the original series of variables and it is found that a good deal of the total variation is accounted for by the first four components. It is possible, however, to associate these components with certain of the variables and to give them some general meaning. In this case the associations were as follows:

- Component 1 Social class
- Component 2 Population growth 1931-51
- Component 3 (a) Development after 1951
 (b) The working population in 1951
- Component 4 Housing conditions

These are taken to be parameters of difference among the towns of England and Wales and a process of classification is set up based on the weightings recorded on the first two components with the additional evidence of the next two used when needed. The scheme aimed at producing groups of at least ten towns and ended with fourteen groups. From these London and Huyton were excluded since they were 'too different from other towns to be included in any group'. This is an allocation based not on *simple function*, but on a large number of criteria. Nevertheless, the final groupings accentuate a functional description. In outline, the scheme is given in table 4-2.⁴⁰

³⁹ S. Gregory (1963) *Statistical methods and the geographer* (London).

⁴⁰ G. A. Moser and W. Scott (1961), 17-8, 80-93.

lous cases would become the decisive ones. His choice of the K point was specifically made to avoid that problem. To some extent Ullman and Dacey minimize the difficulties since the variation of the minimum with city size is taken into account. This non-basic ratio is subsequently used to classify cities not by comparing one employment sector with another but by measuring the extent to which a city departed from the various minima, thus providing an Index of Diversity (D) where

$$D = \sum_i \left[\frac{(P_i - M_i)^2}{M_i} \right] / \frac{(\sum_i P_i - \sum_i M_i)^2}{\sum_i M_i}$$

where i = each of employment groups,

P_i = percentage employed in each of i groups,

M_i = minimum requirement for each group,

\sum_i = the sum of all the groups.

The higher this Index the more specialized is a town, the lower, the more diversified. It is apparent that this Index demonstrates how statistical measures are increasingly employed and how the study of the ways in which towns differ from each other is the real basis of classification. This leads on to the last group of classifications.

e. Multivariate analysis

One of the major criticisms of all the systems so far described is that they rely on one set of data only. It is true that a number of measures have been proposed for the economic base including wages and salaries, value added and production, but the sheer difficulty of obtaining and using data has confined schemes to employment figures. By using multivariate techniques, it is possible to examine how towns are related to a series of variables. Perhaps the best example of this is in *British towns: a statistical study of their social and economic differences* by Moser and Scott.²⁸ The reasons for and the objectives of this work are succinctly stated. It is contended that 'no systematic and general research has been done into ways in which British towns differ or resemble one another', therefore the authors try to assemble and collate material relevant to this purpose and then to classify towns on the basis of their social, economic and demographic characteristics. They confine their work to towns of over 50,000 population and for these assemble a total of 57 variables generally grouped under the headings Population Size and Structure, Population Change, Households and Housing, Economic Character, Social Class, Voting Characteristics, Health and Education. Only a selection of towns is analysed, the selection being

²⁸ G. A. Moser and Wolf Scott (1961) *British towns, a statistical study of their social and economic differences* (London).

Another attempt at investigation into urban character was made by Hadden and Borgatta⁴² in relation to American cities. Sixty-five variables were used and separate analyses for different city sizes were carried out. From the matrix sixteen factors were extracted and the first of these, 'socio-economic status', was the same as that in the British study. The second, third and fourth factors however, were linked to 'non-white population', 'age composition' and 'education'. Subsequently the factors were used to select variables in order to construct a profile for each city by a simple decile division and though this does not provide a classification as such, it does provide a socio-economic profile (table 4-3).

table 4-3: Sample profiles of American cities. *After J. K. Hadden and E. F. Borgatta (1965)*

Profile item	New York	Chicago	Cincinnati	Arcadia
Total population 000s	7781	3550	0502	0041
Per cent single dwellings	0	0	0	0
Density	9	9	7	3
Median income	4	7	3	9
Deprivation index	7	7	7	0
Per cent non white	7	8	8	0
Per cent foreign born	9	8	3	5
Median age	8	7	6	9
Per cent population increase 1950-1960	1	1	1	8
Per cent same house 1955-1960	8	4	3	3
Per cent migrants	2	0	1	4
Education centre	6	3	7	8

Arcadie (Calif.) is included as a small town example.

This however carries the problem away from that posed at the outset which related economic function to the broader issues of urban character.

2. SUMMARY

Five broad methods have been surveyed forming a progression from simple description through classification by one criterion to elaborate statistical processing. At this point, some review of these methods is appropriate. Any system of taxonomy is arbitrary and this arbitrariness becomes emphasized when variates rather than attributes form the basis.⁴³ The whole system established can only be judged in the light

⁴² J. K. Hadden and E. F. Borgatta (1965) *American cities, their social characteristics* (Chicago).

⁴³ See Harold M. Mayer and Clyde F. Kohn (1959) *Readings in urban geography*, 127-8 (Chicago).

table 4-2: Classification of British towns classes identified by G A Moser and W Scott (1961)

Mainly resorts administrative and commercial towns

- 1 mainly seaside resorts
- 2 mainly spas professional and administrative centres
- 3 mainly commercial centres with some industry

Mainly industrial towns

- 4 including most of the traditional railway centres
- 5 including many of the large ports as well as two Black Country towns
- 6 mainly textile centres in Yorkshire and Lancashire
- 7 including the industrial towns of the north east seaboard and mining towns of Wales
- 8 including the more recent metal manufacturing towns

Suburbs and suburban type towns

- 9 mainly exclusive residential suburbs
 - 10 mainly older mixed residential suburbs
 - 11 mainly newer mixed residential suburbs
 - 12 including light industry suburbs national defence centres and towns within the sphere of large conurbations
 - 13 mainly older working class and industrial suburbs
 - 14 mainly newer industrial suburbs
- Not allocated London and Huyton

It is interesting to compare these results with the initial identification of urban functions which was suggested at the beginning of this chapter

- 1 *Central place activities* are directly comparable with the 'mainly administrative and commercial towns' which Moser and Scott identify as Group 3. But the Resorts which they also include (Groups 1 and 2) would have to be placed with the Special Activities and it is unfortunate that this major class straddles distinctive central place and special functions.
- 2 *Transport activities* are not directly shown to produce a distinct set of towns, though Groups 4 and 5 in the classification are identified broadly in these terms. But these groups include other towns as well with no distinctive transport function.
- 3 *Special activities* include the remaining groups, although 'suburbs' have no distinctive functional connotation. They are parts of larger units which appear in the classification due to the use of local government units.

This detailed investigation can be effectively compared with Arousseau's scheme for it is particular to an area, precise in definition and 'the criteria of classification emerged from the analysis itself'⁴¹

⁴¹ G A Moser and W Scott (1961), 18

of analysis are perfectly satisfactory and adequate for many geographic purposes, but the direction of further progress undoubtedly lies in the more sophisticated forms of regional analysis.

In considering the problem of 'hierarchies' in his work *Locational analysis in human geography*, Haggett looks upon all the specialized centres as being merely discordant elements in an otherwise ordered situation.⁴⁸ His analysis of this discord involves basic-non-basic studies, distortion due to agglomeration and to resource localization including the whole nexus of Weberian location studies. To append these as mere distortions of the central place order is disingenuous for what is required is the integration of these great ranges of studies. This task Isard attempted in part in his massive work *Methods of regional analysis* but the final synthesizing channels are left as conceptualized but not operational. If, therefore, the goal is made more modest, it is possible to carry out a meaningful analysis of town location through such classificatory procedures as have been advanced in this chapter, the complex is not necessarily the best.

At this stage, however, it is necessary to reinforce the notion of the influence of specialized functions on urban growth and to demonstrate them as something more than a mere distortion of a basic regularity. Perhaps the simplest model of these influences has been put forward by Pred,⁴⁹ although his work owes something to the earlier schemes of 'cumulative causation' put forward by Myrdal⁵⁰ in his studies of economic growth on a regional basis. Pred concerns himself more directly with the growth of American cities between 1860 and 1910 and proposes a model of 'the circular and cumulative process of industrialization and urban-size growth'. If the introduction of factory industries into a mercantile city is envisaged then the chains of reaction illustrated in figure 4-2 are evoked. 'New manufacturing functions, whether or not they primarily serve local markets, will have an initial multiplier effect',⁵¹ that is new services will be demanded, while linked industries will be encouraged. The result will be 'an alteration of the city's occupational structure (with a more even balance struck between the industrial sector and the wholesaling trading complex), an increase in population, or growth in urban size, and the probable attainment of one or more new local or regional industrial thresholds'.⁵² This

⁴⁸ P. Haggett (1965) *Locational analysis in human geography*, 130 et seq. (London).

⁴⁹ A. R. Pred (1966) *The spatial dynamics of the US urban industrial growth 1800-1914: interpretation and theoretical essays* (Cambridge, Mass.).

⁵⁰ For a review of Myrdal's ideas see D. E. Keeble (1967) 'Models of economic development' chapter 8 in R. J. Chorley and P. Haggett, editors (1967) *Models in geography* 243-302 (London).

⁵¹ A. R. Pred (1966) 25.

⁵² A. R. Pred (1966), 26.

of the particular purpose in hand, for all classifications of the order discussed here are only more or less satisfactory methods of associating like things so that understanding becomes easier. The main purpose of classification is to provide a rational framework for description and to lead toward a developed analysis of location. Aurousseau, as a preface to his scheme, wrote 'When we examine the idea of position in an abstract way, it is at once evident that function is the driving force in the life of towns'.⁴⁴ Position or location can only be understood through function. Of itself a location is meaningless and, as is true of all resources, only gains meaning through use. The type of use is shown quite clearly in both Harris's and Nelson's classifications and, from the viewpoint of the simplest needs of the urban geographer, this form of classification is acceptable. It is true that only the crudest and most elementary insight is given into the complex working of the urban economy. It is to further this insight that economic base studies have grown. Properly speaking there is no single criterion for using the base concept. Any urban investigator is free to use the base for whatever purpose he has in mind. This is merely another way of saying that the urban base approach is a framework of analysis. Its advantage over the other frameworks is that it points up the interactions of the local economy in a meaningful manner.⁴⁵ Base studies are, therefore, likely to be worth while when a more detailed investigation of the urban economy over an area is required. In addition, such studies do attempt to provide some limited form of conceptual basis for comprehension, as well as a classification for description.⁴⁶

Finally, the multivariate analysis is of a different order for it is itself a measure of the degree of difference between towns and not of special functions. However, classes, given descriptive names, have been derived from the known character of the members or 'urban profiles' have been constructed. Moser and Scott make the revealing statement that 'It is gratifying that the final classification corresponds so well to one's common-sense knowledge of British towns. It is clearly more satisfactory to have a group of towns which can reasonably be labelled than a group which contains diverse elements'.⁴⁷ This means little more than that the investigation confirmed the standard but simple classifications of the type proposed by Aurousseau. There would be considerable food for thought were it otherwise. The simple forms

⁴⁴ M. Aurousseau (1921) 569

⁴⁵ Charles M. Tiebout (1956) 'The urban economic base reconsidered' *Land Econ.* 32, 95

⁴⁶ For critical evaluations of the economic base concept see Part II of Ralph W. Pfouts, editor (1956)

⁴⁷ G. A. Moser and Wolf Scott (1961) 89-91

Pred which initiates cumulative growth Wilbur R. Thompson has also proposed what he calls 'stages of urban growth'⁵⁶ beginning with the 'stage of export specialization' where the local economy is dominated by a single industry or even a single firm. Presumably one could envisage this as equivalent to the town in former times, when it was dominantly a defensive, military strongpoint. This is followed by a 'stage of export complex' where a broadening of the local economy takes place possibly by extending forward or backward stages in production or by adding suppliers or consumers of intermediate products. Presumably in the parallel quoted above this stage would be achieved by the broadening of primarily military functions into commerce and administration. Thompson next proposes a 'stage of economic maturation' or 'local service sector puberty' where local activity replaces imports with its new 'own use' production and business and services are expanded. This leads to the final 'stage of regional metropolis', where the local economy is seen as a node connecting and controlling neighbouring cities, once rivals but now satellites. It is interesting to observe that Smolensky and Ratajczak envisage a regular pattern of 'elemental' settlements transformed by the discriminating advantages of particular site characteristics, while Thompson seems to think in terms of an initial stage where site characteristics discriminate transformed to one where the regional metropolis 'organizes' its satellites. These notions have some relevance to the problems left at the end of the last chapter.

One phrase used by Pred can here be isolated. The changes which have been contemplated are accompanied by 'an alteration in the city's occupational structure' and this has been the concern of the present chapter. Industrialization, or the growth of any special functions, affects urbanization and vice versa, so that the size and spacing of cities is in part the product of the way in which the specialized tasks which cities perform—mining coal, making cars or providing rest and relaxation—are carried out. This means that consideration of these roles has to be married with that of general regional functions in any total explanation of the urban pattern.

It is, however, apparent that the larger the city, or the more advanced the economy in terms of western industrial capitalism, then the more multifunctional the city becomes. One of the more recent attempts at the sort of classification discussed in this chapter is that by B. J. L. Berry considering what he terms the latent structure of the American

⁵⁶ W. R. Thompson (1965) *A preface to urban economics*, 15–16 (Baltimore). W. R. Thompson (1968) Internal and external factors in the development of urban economies in H. S. Perloff and L. Wingo, editors (1968) *Issues in urban economics*, 43–63 (Baltimore).

attainment of new thresholds will, in turn, support new manufacturing functions and encourage invention and innovation, and so the whole circular and cumulative process continues, until interrupted or impeded by diseconomies or by competition from other growing centres. To some extent Pred's work is a more sophisticated interpretation of the old elementary notion of 'geographical inertia', for which he provides a convincing rationale. Nor has Pred been alone in attempting

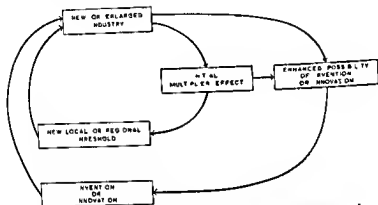


Figure 4-2 The circular and cumulative process of industrialization and urban size growth *After A R Pred (1966)*

to suggest generalizations of this sort. Smolensky and Ratajczak⁵³ have proposed a sequence of three stages which they call 'elemental settlement', 'conforming city' and 'urban agglomerate'. The 'elemental settlement' originates because of economies of specialization in performing what would otherwise be ubiquitous economic activities.⁵⁴

This explanation is directly in line with central place theories. Such a settlement 'becomes a "conforming city" when a factor specific to that site, giving an absolute cost advantage to entrepreneurs locating in that town, becomes economically relevant to profit maximizing entrepreneurs'.⁵⁵ This implies the sort of transformation suggested by

⁵³ E. Smolensky and D. Ratajczak (1965) 'The conception of cities', *Explor. entrepr. Hist.*, Second ser. 2, 90-131.

⁵⁴ E. Smolensky and D. Ratajczak (1965), 90-1.

⁵⁵ E. Smolensky and D. Ratajczak (1965), 91.

Notes on further reading

There is an extensive, if somewhat repetitive literature on the functional classification of towns. The most useful and incisive contribution is Smith's paper

SMITH, R. H. T. (1965) Method and purpose in functional town classification (see footnote 7)

His scheme for Australian towns should be consulted, it also contains a bibliography

SMITH, R. H. T. (1965) The functions of Australian towns *Tijd voor Econ en Soc Geog* 56, 81

'A review of classificatory schemes' is included in chapter 2 of

HADDEN, J. K. and BORGATTA, E. F. (1965) *American cities: Their social characteristics* (Chicago)

The most useful summary of schemes using economic base notions is in

ALEXANDERSON, G. (1956) *The industrial structure of American cities* (see footnote 34)

Studies further to those mentioned in the text are

AHMAD, Q. (1965) Indian cities characteristics and correlates *Univ. of Chicago, Dept. of Geog., Research papers* 102

CARRIÈRE, C. and VINCHEMEL, P. (1963) Le fait urbain en France (Paris) *Levre IV, Les fonctions urbaines*, 243-304

HANCE, W. A. (1960) The economic location and function of tropical African cities *Human Organization* 19, 135

HARRIS, C. D. (1945) The cities of the Soviet Union *Geog. Rev.* 35, 107

HART, J. F. (1955) Functions and occupational structure of cities of the American South *Ann. Assoc. Am. Geogr.* 45, 269

LAL, A. (1959) Some aspects of functional classification of cities and a proposed scheme for classifying Indian cities *Nat. Geogr. J. India* 5, 12

MINTS, A. A. and KISHOREV, B. S. (1959) An economic geographic typology of Soviet cities *Izvestiya Geografi* 45, 72 in Russian but see also—R. J. Fuchs (1964) Soviet Urban Geography: an appraisal of post war research, *Ann. Assoc. Amer. Geogr.* 54, 282

SANDRU, I., CLUCU, V. and FOGHIRE, P. (1963) Contribution géographique à la classification des villes de la République Populaire Roumaine *Ann. de Geog.* 72, 162, 185

STEIGENGA, W. (1955) A comparative analysis and classification of Netherlands towns *Tijd voor Econ. en Soc. Geog.* 46, 105

TREWARTHA, G. T. (1952) Chinese cities: origins and functions *Ann. Assoc. Am. Geogr.* 42, 69

WATANABE, Y. (1961) An analysis of the function of urban settlements based on statistical data. A functional differentiation vertical and lateral *The Science Reports of Tohoku University (7th Series), Geography* 10, 63

A most useful volume with wider applications is

BERRY, B. J. L. (1972) *City classification handbook: methods and applications* (see footnote 57)

urban system.²⁷ A factor analysis with a varimax rotation was carried out of a 1762 (cities) by 97 (variables) data matrix. The factors abstracted are shown in table 4.4. The conclusions from this exercise

table 4.4 Latent dimensions of the American urban system in 1960. After B. J. L. Berry (1972)

Factor no	Factor description
1	Functional size of cities in an urban hierarchy
2	Socioeconomic status of the city residents
3	Stage in family cycle of the city residents
4	Nonwhite population and home ownership
6	Recent population growth experience
6	Economic base: college towns
7	Population proportion foreign born or of foreign stock
8	Recent employment expansion
9	Economic base: manufacturing
10	Extent of female participation in the labour force
11	Economic base: specialized service centres
12	Economic base: military
13	Economic base: mining
14	Extent to which elderly males participate in labour force

suggest that if the factors are uncorrelated then the economic base of urban centres tends to act independently of other urban structural features. As multifunctional towns lose distinction in economic specialization it is the broader socioeconomic dimensions which emerge as bases of contrast. The distinctive towns specialized by their economic bases are small and unimportant. 'It follows that the traditional economic approach to city classification is of minimal and declining relevance'. The one exception is the market-orientated activities, for every urban system is hierarchically structured, the structure resting on aggregate economic power, and, as Berry concludes, the functional size of centres in an urban hierarchy is a universally latent dimension. Two conclusions follow:

1. Into the patterns of urban growth so far set out needs to be added a process of functional change by which, as divergences of economic base are progressively diminished, contrast is developed in the general and separated contexts of socioeconomic status and life cycle stage, and possibly a racial or ethnic characteristic as the society becomes culturally heterogeneous.
2. The one exception is the universal size dimension and it is to the consideration of this and its hierarchical structuring that this study must now turn.

²⁷ B. J. L. Berry (1972) *Latent structure of the American urban system*, in B. J. L. Berry, editor (1972) *City classification handbook: methods and applications*, 33-60 (New York).

title, for the aim of the author is to establish a deductive theory which reveals the 'Ordering principle' in the distribution of towns. Christaller justifiably set his ideas alongside those of Von Thünen in relation to agricultural production² and Weber in relation to industrial location.³ It cannot be overstressed that Christaller was seeking to elaborate a deductive theory and that deductive reasoning more and more occupies the heart of science. *The more advanced a theory is, the more its exposition assumes deductive form* — an advanced science is an immense system of interconnected facts, new discoveries are fitted into the system even if at times the system must be modified to accommodate them.⁴ The system in turn 'guides us to further experimental observations, finally it shows us what are the right questions to ask if we seek to understand the world in which we live'.⁵ Christaller's initial procedure, therefore, is to outline what he calls 'fundamental meanings', that is, the assumptions on which his argument is based. These assumptions are the *a priori* foundations of the whole construct. If they can be shown to be manifestly untrue then the model itself, however meticulous and valid its internal logic, will not truly generalize the real world and will be at odds with empirical findings. When a model such as this seems not to be confirmed by investigation of the real world it may be due to

- 1 faulty logic in the building of the model,
- 2 the inclusion of an inadequate array of variables,
- 3 untrue assumptions

Foremost among Christaller's assumptions is the one that towns act as central places for the countryside, that they come into being to carry out at a central accessible place the tasks which the life of the countryside creates. Christaller acknowledges that this basic assumption is derived from previous workers, as early as 1916 Gradman⁷ had contended that the distinctive role of a town was 'to be the centre of its rural surroundings and mediator of local commerce with the outside world',⁸ collecting and exporting the local products, importing and distributing the necessary goods and services which the countryside demands. The significance of this role cannot be measured by the

² J. H. Von Thünen (1826) *Der isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie* (Hamburg)

³ A. Weber (edited by C. J. Friedrich) (1929) *Theory of the Location of Industries* (Chicago)

⁴ S. Stebbing (1943) *Modern Elementary Logic*. 2nd. Thus a quotation from Einstein

⁵ S. Stebbing (1943) 184

⁷ R. Gradman (1916) *Schwabische Städte* *Z. Ges. Erdk.* (Berlin)

⁸ R. Gradman (1916) 427

5 CENTRAL PLACE FUNCTIONS AND CENTRAL PLACE THEORY

In the last chapter means were suggested by which the special functions which towns perform could be identified and evaluated. In order to introduce some clarification into this process, systems of classification were proposed. These make it possible, if only in general terms, to isolate those functions which are only found in *some* towns and leave remaining those functions which are common to *all* towns. Every town (in some measure) acts as a focus for the surrounding countryside and it is from this role that the general functions are derived. Since in acting as a focus the town functions as a central place, the term 'central place functions' is commonly used and from this, central place theory has developed.

No consideration of central place theory can proceed far without introducing the name of Walther Christaller whose work *Die zentralen Orte in Süddeutschland* (*Central places in southern Germany*) was published in 1933¹ and it is well to begin an analysis of central place theory² with Christaller's ideas. He divided his book into three parts. The first, called the Theoretical Part, was concerned with the setting up of the theory, the second, the Connecting Part, considered practical methods whereby the theory could be tested in the real world, in the last part, the Regional Part, southern Germany was examined, and the methods devised in the second part were employed to substantiate the theory. The practical methods devised were not very successful and have not been used subsequently and it follows that the regional application is also of limited value. It is the theoretical part which is of greatest interest and worthy of close attention.

The introduction to the theoretical part of Christaller's book is entitled 'Are there laws which determine the number, distribution and size of towns?' and the major theme of the first part is contained in this

¹ W. Christaller (translated by C. W. Baskin), (1966) *Central places in southern Germany* (Englewood Cliffs N.J.)

² B. J. L. Berry and A. Pred (1961) *Central place studies: a bibliography of theory and application. University of Pennsylvania, Regional Science Research Institute, Bibliography Series 1*. Supplement published in 1965. This is the major source for material relative to central place theory. It contains a useful introductory review. A further supplement has been added. H. F. Andrews (1970) *Working notes and bibliography on central place studies 1965-1969. University of Toronto, Dept. of Geography, Discussion Paper 8*.

of a town for whereas size might be a measure of 'importance' not a measure of centrality. Indeed it includes in an initial the population due to those special functions which we at great pains to exclude. Centrality the degree to which a town serves its surrounding area, can only be measured in terms of the goods and services offered. There are variations in quantity as well as in quality, there are different orders of goods and services for some are costly and purchased or needed infrequently and will need large populations to sustain them, others are everyday needs and will require small populations. From this two concepts emerge

- 1 *Threshold population** Christaller did not use this term but the concept is implied in his construct. The threshold is defined as the minimum population that is required to bring about the offering of a certain good for sale or to sustain any service, in economic terms this means the minimum demand to make such an offering viable. Assuming uniformity of income, consumption and taste it can be measured in terms of population numbers. In a concrete way this concept is easily demonstrated by the minimum varying population required to maintain successively a district nurse, a doctor, a specialist doctor such as a paediatrician, a general hospital and a specialized eye hospital. To evaluate these minima is much more difficult.
- 2 *Range of a good or service*. This is the maximum distance over which people will travel to purchase a good or derive a service offered at a central place, as some range from the centre the inconvenience of travel measured in time, cost and trouble will outweigh the value or need of the good or an alternative nearer centre becomes available. Again this can be visualized in the length of journey to buy bread which is likely to be very small and hence there will be very frequent trips, as against a journey to buy a fur coat, where in relation to the value of the article and the infrequency of demand a much longer trip would be tolerated. If a sick and dying person can only obtain remedial treatment in one place in the world, then the range of the service could be extended to its absolute maximum measured in miles. Again there are severe practical problems in that most journeys have multiple purposes one can buy the bread and the fur coat on the same trip but these are excluded from the present theoretical consideration.

* For this see B. J. L. Berry and W. L. Garrison (1958) A note on central place theory and the range of a good *Econ Geogr* 34 and Recent developments of central place theory *Pap Proc Roy Soc Austr* 4, 107

It is possible from the above to isolate two limits in relation to each good or service, one can be called a lower and the other an upper limit (figure 5-1). The lower limit is determined by the minimum demand necessary to ensure a commodity or service is offered, that is, the threshold, the upper limit is that beyond which a good will no longer be obtained from a centre, the range.

If these principles are now applied as controls to the development that would take place on an isotropic surface, that is a flat uniform plain of equal population density and with no variation in wealth or income, then it is possible to derive a model of town distribution. At

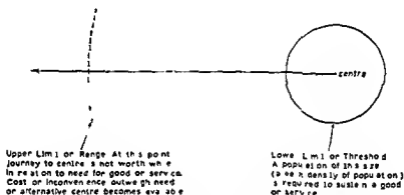


Figure 5-1 The lower limit (Threshold) and the upper limit (Range) of a good from a central place

this point a word on nomenclature must be interposed. Christaller designated the various ranks of settlements by using the initial letter of the different orders of settlements as they could be identified in southern Germany. They are listed in table 5-1 and used in this discussion. To continue the argument a settlement given the rank 'B' is postulated. This serves the surrounding area and if one of the goods which it offers, number 21, can be given the upper limit, or range of 21 kilometres, and if the lower limit or threshold is such that it can only be offered at B, then it will be supplied over an area of 21 kilometres radius about B. Now if the next central good, number 20, has a range of 20 kilometres, then there will emerge a ring one kilometre wide which cannot be served from B with that good. Further centres are therefore presupposed and if the lower limit, or threshold, is sufficiently elastic, then these must be of the same B order. But they must be

of a town for whereas size might be a measure of 'importance' not a measure of centrality. Indeed it includes in an initial the population due to those special functions which we at great pains to exclude. Centrality, the degree to which a town serves its surrounding area, can only be measured in terms of the goods and services offered. There are variations in quantity as well as in quality, there are different orders of goods and services for some are costly and purchased or needed infrequently and will need large populations to sustain them, others are everyday needs and will require small populations. From this two concepts emerge

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* For this see B. J. L. Berry and W. L. Garrison (1958) A note on central place theory and the range of a good *Econ Geogr* 34 and Recent developments of central place theory *Pop. Proc. Reg. Sci. Assoc.* 4, 107.

kilometres can be offered effectively at the *B* and *K* centres, but good number 11 cannot, for once more the unserved one kilometre ring will emerge, a further series of lower order service centres has to be introduced. In this way, a whole hierarchy of central places emerges with towns of equal rank equidistant from each other. Christaller called the area which a town served the 'complementary region' and under the conditions above, these regions were circular. However, to avoid overlap, and to match the densest distribution of settlement points, the circular regions were transformed into hexagons.

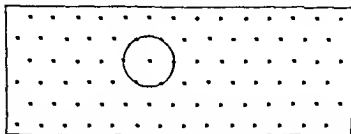


Figure 5-3 The most closely packed equidistant distribution of points (settlements) and the smallest association of centres

If there are further goods for which the threshold population required is greater than that provided by the *B* system, then one place alone from that system may be sufficient and it accordingly will acquire higher value as a central place and is given the designation of a '*G*' centre. It will have a range of 36 kilometres as suggested above, for it is now apparent that it is at a value three times the next lower range limit that transition from one rank of central place to another becomes necessary. New and higher order centres will therefore be found with ranges of 62 kilometres and 108 kilometres. At each of these distances new types of goods can be offered because the range, and thereby the threshold population, is increased. Each central place is able to offer all the goods of lower order centres and, in addition, a distinctive range of goods related to the increased size of its hinterland. On this basis a distinctive series of ranks emerges which is referred to as the urban hierarchy. The pattern finally produced is shown on figure 5-4 and in table 5.1.

It should be apparent, however, that the threshold and range of any one good or service will be an arbitrary figure and consequently it is possible that each one will demand a different hierarchical structure.

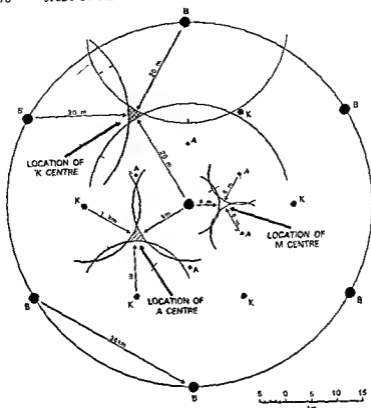


Figure 5.2 The derivation of the urban hierarchy after Christaller (1966). For explanation see text. This diagram comes from C. R. Lewis (1977) *Central Place Analysis*. Unit 10: Fundamentals of Human Geography. Open University.

equidistant from *B* in terms of all the presupposed conditions and if the most closely packed equidistant distribution of settlement points is adopted there will be six of these on a ring about *B* (figure 5.3).

Christaller gives the distance between these centres as 36 kilometres although the justification of this is provided later and such arithmetical distances should not properly be part of a deductive structure. For still lower order goods the next locations will be those at the centres of equilateral triangles joining the *B* centres (figure 5.2) at these points *K* centres will emerge. Now goods numbers 19, 18, 17, 16, 15, 14, 13 and 12 with ranges of 19, 18, 17, 16, 15, 14, 13 and 12

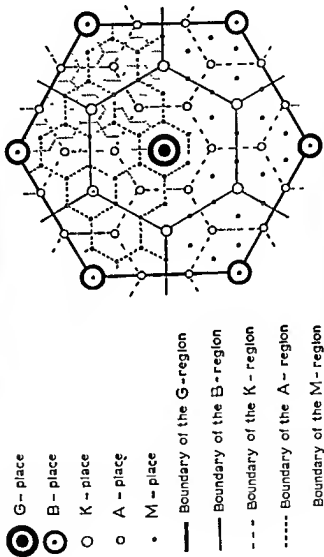


Figure 5-4: The central place system after Christaller In this construct $K = 3$

table 5-1 The orders and arrangement of centres

Type of centre i.e. rank or order	Number of places	Number of complementary regions	Range of region in Kilometers
M (Markort)*	486	729	4 0
A (Amtsort)	162	243	6 9
K (Kreisstadt)	54	81	12 0
B (Bezirksstadt)	18	27	20 7
G (Gaustadt)	6	9	36 0
P (Prov. nztadt)	2	3	62 1
L (Landstadt)	1	1	108 0

*The terms used in this table are the ones most frequently employed in an English context: the first part referring to administrative areas such as Gau or Kreis and the stadt meaning city. The longer terms used by Christaller were Marktflecken (Market locations), Amtstättchen (Office towns), Kreistättchen (County seats in the American meaning of the term), Bezirkshauptorte (main district or regional centres), Gaubezirkshauptorte (Gau centres), Provinzialhauptorte (provincial capitals), Landeszentralen (major regional centres). Christaller also added Reichsstädte or RT for those cities which were more than major regional centres but not national capitals with populations of about 1 million and Reichshauptstädte or R (world cities or national capitals with a population of over 2 million). (Source: C. W. Baskin (1957) *A critique and translation of Walter Christaller's Die Zentralen Orte in Süddeutschland*, University of Virginia, unpublished Ph.D. dissertation 345-52.)

Christaller understood this to some extent and was aware that throughout the theoretical part he was describing a special case. In the case demonstrated above, there is a strict ordering whereby each settlement serves its own hinterland and an area/population equivalent to the hinterlands of two other settlements in addition, hence it has been called 'the rule of threes', or, using the constant k to express this, then $k = 3$ (figure 5-4). But still retaining the hexagonal structure of basic settlements Christaller realized that two other situations were possible where $k = 4$ and $k = 7$ as shown on figure 5-5. In order to resolve this problem Christaller associated a controlling principle with each of the three arrangements (figure 5-6).

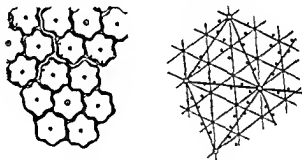
- 1 *The marketing principle* $k = 3$ All areas are served from a minimum set of central places.
- 2 *The transport principle* $k = 4$ There, the distribution is such that as many places as possible lie on main transport routes connecting the higher order centres.
- 3 *The administrative principle* $k = 7$ Efficient administration is the control in this case and this will demand a clear separation of all complementary regions for they cannot be shared administratively.

However, these three principles of arrangement do little to offset the major problem. Christaller presents no argument to justify giving every

MARKETING PRINCIPLE $K=3$



ADMINISTRATIVE PRINCIPLE K-7



TRANSPORTATION PRINCIPLE K 4

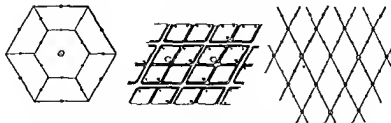


Figure 5 6 The three controlling principles identified by Chr stallier corresponding to the three smallest systems in figure 5 5

good the same threshold and range, or a multiple of these basic measures so that although his theoretical framework is sustained by these means its relation to reality is made more remote

Much detail has been omitted, yet the preceding paragraphs give the core of Christaller's ideas. In a situation not without precedent, another worker was arriving at similar conclusions virtually at the same time. This was August Losch whose *Economics of location* was first published in 1939.¹⁰ Losch was concerned with the central problem of the location of economic activity and particularly with the creation of economic regions. His emphasis was, therefore, like Christaller's on economic factors as against what he termed the 'natural' or 'political', raw materials were to be equally dispersed over a flat plain characterized by a pattern of self-sufficient farms equally spaced in the densest possible manner. Spatial differences would emerge from this postulated initial situation owing to the forces of concentration brought into play by the possibility of specialization and of the operation of economies of scale, although there would be limiting forces in the

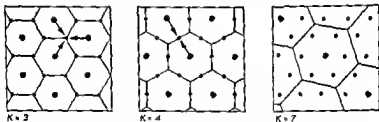


Figure 5-5. The central place system: the three smallest systems $K = 3$, $K = 4$ and $K = 7$. After P. Haggett (1965)

form of transport costs and the benefits of diversified production.¹¹ Losch outlined the situation of one of the farmers who set out to produce beer, a secondary productive activity, it should be noted, and not a tertiary service. The size of his market can be determined from the relations implicit in the normal individual demand curve (figure 5-7)

If OP is the brewery price, the individual will buy PQ . But away from the centre of production, P , the price will increase due to transport

¹⁰ A. Losch (1954) *The economics of location* (New Haven). This is an English translation by W. H. Woglom. The German edition first appeared in 1939.

¹¹ A. Losch (1954), 105.

maximum shipping distance, that is the range over which beer can be sold. But the output of the brewery can be reduced and production still be profitable until the two curves are tangential (see broken line on figure 5-8). Thus M_1F is a measure of the minimal area needed before beer can be produced and if this be multiplied by a factor representing population density, then the minimum number of people required to sustain the brewery is obtained. To translate this into terms already used, this is the 'threshold population'.

It will be apparent that we are here very close to Christaller. MF is the upper limit and M_1F the lower as defined above. The two authors have similar fundamental ideas but they have couched them in different arguments.

Losch proceeds to demonstrate that his analysis will result in a series of circular market areas but in order to cover the territory most economically these are converted into hexagons and a proof provided that this is justifiable. The hexagonal structure is dependent on the number of farms required to institute the production of a commodity and this number will vary considerably from commodity to commodity. Lösch, unlike Christaller, allows for this fact and adapts it into his structure. Given the closest packed distribution of farms and hexagonal market areas the smallest number of farms which can be served is three as in figure 5-5. This is the minimum threshold and thereafter the succession continues through four and seven (figure 5-5). This is in accord with the argument developed by Christaller, but Lösch continues the logic of this procedure for there is a whole series of succeeding arrangements out of which Christaller only isolated the three smallest cases. The whole series continues 3 4 7 9 12 13 16 etc. Lösch proceeds to consider the *ten* smallest areas and tabulates the relations between them (figure 5-9 and table 5-2).

As intimated earlier, every good sold, every service offered will have a different lower and upper limit, a different threshold and range and indeed, could be offered at a variety of different points. There is no reason therefore why a chaos of different meshes should not occur thrown over the supposed uniform plain. Some order can be introduced by arbitrarily centering all the meshes on one point, which is *ipso facto* made the metropolis. Further, by rotating the various nets about this point city rich and city poor sectors can be produced with a maximum degree of coincidence. But it must be emphasized that only by excessive and unreal simplification, so that a uniform structure is presupposed with a fixed k , can Christaller's model be derived. Under Lösch's scheme a hierarchy in the strictest sense of the term, that is with an equal and regular addition of the number of subsidiary places served, does not emerge. But distinctive groupings of the subsidiary

costs until at F beer is so expensive that it cannot be sold. PF is the extreme range and total sales will be the volume of the cone, formed by rotating PFQ around P , multiplied by a factor representing population density. So far a constant price has been assumed, OP , but that price

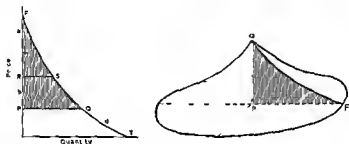


Figure 5-7. Losch's derivation of the market area and demand cone from the demand curve for a product as a function of distance. For explanation see text. *After A. Losch (1954)*

will vary with the total sold, that is with the economies of scale that can be introduced as production increases. A new curve, therefore, is drawn based on the volume of the demand cone calculated for a series of arbitrary prices, that is, it represents total demand as a function of brewery price (Δ , Δ'). On this is superimposed a planning curve, the smallest average cost at which any amount can be produced (π). These must intersect before any beer can be sold, for if they do not, the costs of production exceed the price which sufficient people will pay. On the graph (figure 5-8), MN will be the total that can be sold and MF the

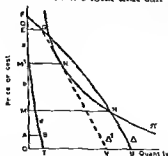
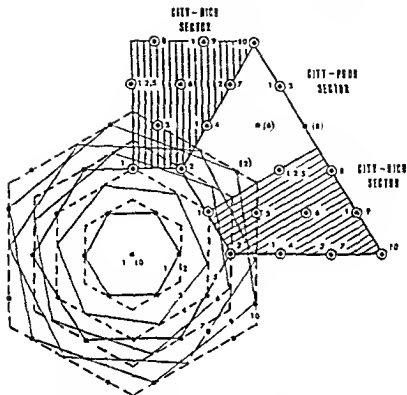


Figure 5-8. Demand curves (Δ)—quantity demanded as a function of price—and Planning curve (π)—smallest average cost related to quantity produced. For explanation see text. *After A. Losch (1954)*



• CENTRAL SETTLEMENTS

⊙ CENTRES OF MARKET AREAS OF 8th ORDER INDICATED BY 1 DOTTED
ALTERNATE CENTRES ARE IN PARENTHESES

Figure 5-9. The ten smallest possible market areas *After*
A. Lösch (1954)

table 5-2: The ten smallest possible market areas

Area no	No. of settlements completely supplied	Distance between centres	Range
1	3	$a/\sqrt{3}$	a
2	4	$a/\sqrt{4}$	a
3	7	$a/\sqrt{7}$	a
4	9	$a/\sqrt{9}$	a/3
5	12	$a/\sqrt{12}$	2a
6	13	$a/\sqrt{13}$	a/3
7	16	$a/\sqrt{16}$	2a
8	19	$a/\sqrt{19}$	2a
9	21	$a/\sqrt{21}$	a/7
10	25	$a/\sqrt{25}$	a/7

places can be found and hence distinctive ranks identified. The confusion here is possibly semantic but clear comprehension is essential if empirical studies are to be properly conducted and interpreted. 'To conclude, therefore, it must be admitted that whilst the functional array of services does fall into distinct groupings in all cases, it is only when a fixed k is assumed that a strict hierarchy in the Christaller sense is obtained.'¹²

At this stage, it is appropriate to introduce another interpretation of city size: this is the Rank Size Rule for Cities. The basis of the 'rule' was originally put forward by Felix Auerbach in 1913,¹³ but its development and popularization is associated with George K. Zipf¹⁴ in a volume published in 1941 and entitled *National unity and disunity*. In loose terms the 'rule' states that if the population of a town is multiplied by its rank, then this will equal the population of the largest and highest ranked city. It is often stated as

$$R^n S_R = M$$

where R = the Rank of a city, S_R = the Population of a city of rank R , and M and n are constants.

But where R is 1, whatever the value of n , S equals M so that the constant M is the population of the largest city. It is also less reliably argued that in western industrial countries the constant n is equal to

¹² W. K. D. Davies (1964) *The hierarchy of commercial centres, a case study in South Wales*, 2-10 (University of Wales unpublished Ph.D. thesis).

¹³ F. Auerbach (1913) *Das Gesetz der Bevölkerungskonzentration*. *Peiermanns Mit.* 59, 74.

¹⁴ G. W. Zipf (1941) *National unity and disunity* (Bloomington, Ill.).

At this stage some brief review of the argument is needed. Models of the distribution of central places have been deduced and these hold good under the condition that special functions are excluded, or severely limited, and that service for a contiguous surrounding area is assumed as the sole urban role and that the earth's surface is a flat, homogeneous plain with an even distribution of resources and population. That empirical study, or indeed 'common sense', might show no such pattern as that envisaged in theory to exist is of no consequence. The point at issue is whether these models are logical constructions which, although isolating only a limited number of factors operative on town distribution and postulating unreal conditions, nevertheless give insight into the nature of town distribution. Moreover, these concepts point in the right direction for they demonstrate the search for unified principles rather than continue the description of individual towns. They connect what had hitherto been isolated fact and they lead to further experimental observation by indicating the most pertinent questions we can ask.

The clearest exposition of the implications of a Christaller type hierarchy has been given by John Marshall.²⁰ He argues that the diagnostic criteria of hierarchical structuring are

- 1 *Spatial interdependence of the centres* This means that there is a network of relationships between the centres represented by physical flows of goods and people. This network focuses on the hierarchically superior town.
- 2 *Functional wholeness of the system* This is perhaps the most important criterion. It implies that any abstraction from the real world for study must consist of a 'whole' system. To an extent this is an impossibility since no system is discrete in an absolute sense but certainly the consideration of arbitrarily defined tracts of territory makes no sense in central place terms.
- 3 *Discrete stratification of centres* This needs little comment. Stratification has to be demonstrated in objective terms.
- 4 *Interstitial placement of orders* This is a spatial requirement in accord with Christaller's notion that lower order towns will occur at intermediate places between the next superior order towns. Whereas this is a conditional of the spatial arrangement, it is difficult to see

²⁰ J. U. Marshall (1969) *The location of service towns. An approach to the analysis of central place systems*. University of Toronto, Dept. of Geography, Research Publ. (Toronto).

forces. The one moved towards diversification where a large number of communities benefited from being located near to raw material sources and minimized transport-costs. The other force was one of unification where a small number of large communities minimized movement of finished goods to the consumer. From these opposing conditions a balance emerged which was reflected in the rank-size rule.

It is apparent at a superficial level that if the rank-size relationship implied in the rule is accepted as an accurate finding, then it completely contradicts the hierarchical situation derived from deductive argument. Christaller postulated a stepped and ranked distribution of size classes, Zipf's finding shows a smooth relation where no distinctive classes can be identified. Insofar as Zipf's work is empirical then its introduction into this chapter concerned with model building is perhaps, unjustified, but the rank-size rule has become such a well known statement that its conflict with Christaller's ideas needs to be noted. But the conflict has been considerably exaggerated and, at this stage, there is no need to accept the view that the rank-size rule undermines the idea of a hierarchy. Attempts have been made to show that the two concepts are not incompatible¹⁶ even when applied to the same data and indeed, the very meaning of the word 'hierarchy' needs clear and precise definition in this context. This has not gone without challenge¹⁷ but there are more cogent and simpler bases for no undue disturbance being generated by the introduction of Zipf's work. The factual truth of the Rule has been challenged and certainly, it has been shown that it applies only to large areas.¹⁸ It measures size by population totals and not centrality as envisaged by Christaller and in consequence, it embraces not only central place functions but special functions as well, those special functions which need to be examined separately from central place functions as the last chapter demonstrated. When all urban functions are massed together then it is perfectly possible that the wide range of other functions, over and above central place functions, can transform a ranked hierarchical array into a continuous rank size relation. The empirically observed rank size rule need not therefore deter us at this stage from accepting the theoretical constructs of Christaller and Losch.¹⁹

¹⁶ B. J. L. Berry and W. L. Garrison (1958) Alternate explanations of urban rank size relationships. *Ann Assoc Am Geogr* 48, 83.

¹⁷ M. F. Dacey (1966) Population of places in a central place hierarchy. *J. Reg Sci* 6(2) 27.

¹⁸ Charles T. Stewart (1958) The size and spacing of cities. *Geogr Rev* 48, 222.

¹⁹ B. J. L. Berry (1967) Modern theoretical departures: chapter 4 of *Geography of market centers and retail distribution* (Englewood Cliffs, NJ). This chapter, which is concerned with mathematical formulation of central place theory, forms an appropriate continuation to the argument presented here.

why it should necessarily be a condition of hierarchical structuring. Thus in a valley re-entrant into a thinly peopled highland mass town rank will increase down valley as successive streams of population meet. A hierarchical structure, dependent on threshold and range can emerge without this particular form of interstitial placement.

- 5 *Incremental baskets of goods* This condition means that each rank can be distinguished by characteristic assemblages of goods, the thresholds of which mean they can only enter at a particular level.
- 6 *A minimum of three orders*
- 7 *A numerical pyramid in order membership* These last two are self-evident.

At the same time there are many difficulties which have already arisen in considering the central place model.

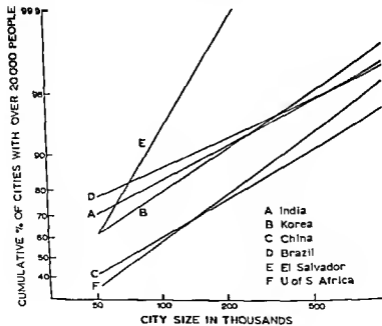
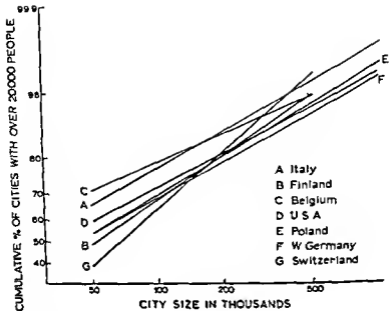
- 1 Christaller's presentation clearly involved excessive simplification and the concept of market, transport and administrative systems appears as an unconvincing attempt to sidestep the difficulties which accumulate about this simple model. The adoption of Losch's approach seriously modifies the notion of a clear-cut, unequivocal hierarchy.
- 2 At least two other ways of ordering towns in a system have been propounded from an inductive, empirical basis and there appears a marked unconformity between these observations and theoretical models. These are

- a Rank-size distribution
- b Primate city distribution

They have both been partly examined in chapter 3.

- 3 The whole approach through these models is static. A state of equilibrium is postulated brought about by the balance of forces derived from the assumptions put forward. Christaller, it is true, does consider 'dynamic factors' but there is but little opportunity in these approaches to include the obviously known facts of town growth and decay.

Figure 5-10 Countries with lognormal (rank size) distributions of urban populations. The upper diagram consists of what are generally regarded as developed countries while the lower diagram shows that this condition is also found in countries generally regarded as underdeveloped. After B. J. L. Berry (1961).



There are further problems but these can best be introduced in the next stage of analysis when empirical verification for central place notions is sought. Verification involves the development of techniques for the ranking of towns and the identification of spheres of influence. These form the next area for consideration.

Notes on further reading

Christaller's work is now easily accessible in translation, and this and Losch's contribution are the major works which should be read.

CHRISTALLER, W (1966) *Central places in southern Germany* (see footnote 1)

LOSCH, A (1954) *The economics of location* (see footnote 10)

Two clear introductions to central place ideas are

BERRY, B J L (1967) *Geography of market centres and retail distribution* (Englewood Cliffs, N J)

MARSHALL, J V (1969) *The location of service towns. An approach to the analysis of central place systems* (see footnote 19)

For a recent exegesis of Losch's work which clarifies some obscure argument see

BEAVON, K S O and MABIN A S (1975) The Losch system of marked areas, derivation and extension *Geog. Analysis* 7, 131

The bibliographies mentioned in the text are essential and should be consulted for some guidance into the large amount of literature on central place studies.

ANDREWS, H Z (1970), Working notes and bibliography on central place studies, 1965-1969 (see footnote 2)

BERRY, B J L and FRED, A (1961) Central place studies: a bibliography of theory and application (see footnote 2)

An interesting and valuable study of early ideas akin to Central Place Theory is to be found in

DAWSON, J (1969) Some early theories of settlement location and size *J. Th. Plan. Inst.* 35, 444

A more advanced and very useful discussion of the 'theory of the distribution of city sizes' is to be found in

RICHARDSON, H W (1973) *The economics of urban size* (Farnborough), Chaps 11 and 12, 139-70

- 3 The retail centre *In this case the count of establishments is limited to retail shops in the central area or CBD which in turn poses problems of definition. Thus in their study in southwestern Iowa, Berry, Barnum and Tennant define a business district as 'a group of spatially contiguous establishments less than 300 feet from each other, and either separated from other establishments by more than 300 feet or if in a continuous shoestring of business falling into "peaks" or "ribbons" of land values'.*⁶

c The level of generalization at which the study is being made

Here again a series of levels can be recognized and this difficulty can be equated with that of weighting for size of a facility or establishment by number of employees, size by floor space or some other measure. In retail trade these problems emerge more clearly and it is possible to conduct a count on the following bases:⁷

- 1 Establishments *In this case one shop is taken at its elementary value and counted as a single unit. It is in this form that most census data are available.*
- 2 Functions *Here each type of outlet is counted regardless of the association in establishments.*
- 3 Functional units *This would imply a count of the total number of outlets regardless of type.*

An example may clarify these possibilities.⁸ There are three shops *A, B and C. A is a grocer, greengrocer and off licence wine and spirit retailer, B is a greengrocer and fishmonger, C is a grocer and butcher. Thus a count would reveal three establishments (A, B and C), five functions (grocer, greengrocer, off licence wines and spirits, fishmonger, butcher) and seven functional units (two groceries, two greengroceries, and one each fishmonger, wines and spirits, butcher).*

If the example quoted is referred back to all three units of study then it will be seen that one person making a field survey in which retail functional units in the retail centre of a town are being surveyed will be working on very different figures from someone using the administrative area of the town and counting all retail, service, social and administrative establishments. Above all, elaborate and sophisticated methods of statistical analysis are of little value if imprecise and ill-considered data are employed.

⁶ B. J. L. Berry, H. G. Barnum and R. J. Tennant (1964) *Retail location and consumer behaviour* *Pap. Reg. Soc. Amer.* 9, 68.

⁷ H. A. Stafford (1963) *The functional basis of small towns*, *Econ. Geogr.* 38, 165.

⁸ W. A. D. Davies (1966), 52.

choosing the words deliberately and thereby introducing the terminology of central place theory. The importance but not the centrality of a town could be measured by its population. It is true that given the conditions of classical central place theory there is an absolute correlation between population and centrality but in the real world the large range of non central place functions adds to the population. This is universally recognized though it has not inhibited analyses based on population totals. In addition there is the further difficulty already discussed in chapter 2 of defining urban populations, for numbers can vary with the area taken.⁴

There is a further problem even if some more direct measure of service to the surrounding area is taken. Towns serve these areas as administrative and social centres as well as economic centres and there is no need whatsoever for these non economic services to be located on an economic basis. Indeed in Britain, it is fairly evident that social services such as hospitals and schools for example, could not be provided in thinly peopled rural areas at an economic level and they are subsidized by inputs from the central government. The examination of rate deficiency grants⁵ to local authorities will amply illustrate this point. It follows that two different principles based on the need for profitability in the one case and the provision of a needed social service on the other are operative. Stated in another way, one situation demands that the threshold value holds, the other does not, so that in this latter case the whole concept of economic threshold is rejected in favour of social need.

b The unit of study adopted

There are three levels at least at which an investigation can be carried out

- 1 The town. This includes all the nominated services within the town area, using an administrative or census definition and including subsidiary shopping centres
- 2 The commercial core. This concentrates on the central area but includes all commercial (i.e. economic) services such as offices and theatres as well as shops

⁴ See page 23 *et seq*

⁵ These are the grants made by the central exchequer to supplement local finances derived from local sources. For an example of the extent of these grants see P. R. Mounfield and H. D. Watts (1968) *Mid Wales prospects and policies for a problem area* chapter 11 in E. G. Bowen, H. Carter and J. A. Taylor editors, *Geography at Aberystwyth* (Card 11). Fig. XI 2(a) is a map of the proportion of expenditure met by rate deficiency grants in England and Wales. These are now called 'Rate Support Grants'.

The complete 'trait complex' derived from the above was $ABCD$ but Smailes accepted as the minimum qualifications for this level $A^1B^1C^1D$ or A^1BC 'Sub-towns' which did not meet these requirements were identified and, by using additional criteria, major towns, cities and major cities were introduced to give a complete ranking of the urban settlements of England and Wales.¹² There is an immediate methodological comparison between this attempt to rank towns and that by Chauncy D. Harris to classify them referred to in a previous chapter.¹³ Both procedures were descriptive but both employed a numerical element to give validity to the categories that were identified by the insight and experience of the classifier. Smailes's scheme was equally important in that it brought the notion of central place before a wide geographical field and was a first approximation to a ranking scheme. Moreover it had a certain element of balance in that retail and commercial activities were represented by Woolworth's and the banks, social services by schools and hospitals, entertainment by the cinema and regional association by the local newspaper. But it was also weak on a number of vital points. The grounds on which the criteria were selected were nowhere made explicit and the choice can only be interpreted as arbitrary. Even with this arbitrary basis no attempt is made to justify the definition of the grades, again, it is not demonstrated that they emerge from the data used. 'The symbols of urbanism' may 'hang together in a trait complex' but there is no proof of this other than the author's assertion. Lastly, the large scale on which this ranking was applied (the whole of England and Wales) meant that a large variety of situations was being forced into the mould of the scheme and many of the real difficulties were avoided in this process.

These criticisms were equally applicable to a similar study by John E. Brush of 'The hierarchy of central places in southwestern Wisconsin'.¹⁴ Brush maintained that the status of trade centres was determined by the functions they perform, by the combination or association of distinctive sets of functional units (i.e. a trait complex) and he then proposes that although clear-cut breaks cannot be recognized, nevertheless 'a threefold classification becomes apparent—hamlets, villages and towns'.¹⁵ This classification is then demonstrated by reference to the presence or absence of key establishments related to a range of central functions: retail trade, wholesale trade, finance,

¹² A. E. Smailes (1946) *The urban mesh of England and Wales. Trans. Inst. Br. Geogr.* 87

¹³ See page 53

¹⁴ J. E. Brush (1953)

¹⁵ J. E. Brush (1953), 385

2 METHODS OF RANKING TOWNS

In chapter 4 it was shown that classification of towns by functional character has become more objective as methods were refined. This is also true of attempts at town ranking. In this case, however, the early purely descriptive stage does not exist, other than in the use of size classes of towns, and it is possible to recognize two major phases, the first in which subjective identification dominated and a second in which objective, statistical investigation of the hierarchy was introduced. A further problem exists in that the direction of emphasis has stressed now the internal characteristics of the town, now its external relations.

The earliest attempts at the empirical identification of the hierarchy of towns which Christaller's logic proposed were based on the *a priori* assumption that a distinctive ranking could be found. This was based upon the analyst's perception that such an ordering existed and the task was not to provide the means by which the existence of a hierarchy could be tested but rather the basis for the identification of ranks of towns which were assumed to exist. There are many examples of this type of analysis but perhaps the most widely known and quoted are those of A. E. Smailes in Britain⁹ and J. E. Brush in the United States.¹⁰

Smailes worked on the basis that 'any grading must in some measure be arbitrary, yet the indefiniteness of boundaries does not warrant denial of the reality of stratification'.¹¹ He was intuitively aware of the existence in Britain of what he called 'the fully fledged town' which was identified as a distinctive stratum in the settlement pattern. Moreover, he also argued that this level was characterized by the occurrence together of certain key features which made up a 'trait complex'. This was made up of

	<i>A</i>	Branches of three of the five major banks together with a Woolworth's store
diminishing to	<i>A</i> ¹	three branch banks
	<i>A</i> ¹¹	two branch banks
and	<i>B</i>	Grammar school and hospital
	<i>B</i> ¹	only one of the above
diminishing to	<i>C</i>	Cinemas
	<i>C</i> ¹	only one cinema
	<i>D</i>	Publication of a local newspaper

⁹ A. E. Smailes (1944) The urban hierarchy of England and Wales *Geogr.* 29, 41

¹⁰ J. E. Brush (1953) The hierarchy of central places in southwestern Wisconsin *Geogr. Rev.* XL, 380

¹¹ A. E. Smailes (1944)

deviation and the variation coefficient, first within the group from its mean value and then from the mean of the indicators left in between the means of consecutive groups.¹⁹ In *qualitative* terms an attempt is made to determine the extent to which central functions belong to the same indicator group by computing coefficients of common occurrence.²⁰ The degree of correlation between the occurrence of functions is used not to show the interdependence of pairs of functions but rather 'the dependence of various institutions on the abstract centrality of central places'.²¹ Thus, for example, in medical and public health activities, the indicators of the second class of centre are

Physician	communal home	= +0.75
	dentist	= +0.82
	health clinic	= +0.66
	veterinarian	= +0.73
	local hospital	= +0.62

where the correlation with the typical central function (physician) is given.²² From thus the lower correlates, the clinic and the hospital, are dropped and the remainder taken as diagnostic.

After this procedure has been followed for each activity, the results are combined in a 'partial synthesis' from which a final ranking is derived. Palomaki's work is interesting in that his indicators are very similar to Smailes's 'trait complex' but they are derived for a series of grades not merely for a preconceived fully fledged town. At the same time the analysis is much wider ranging and a real effort is made to examine critically both in group nearness and between-group distance. But from the brief outline it will be evident that, throughout, a number of subjective decisions are made which determine the result.

In 1958 Berry and Garrison prefaced an examination of the functional bases of the central place hierarchy with the statement that 'there has been no satisfactory evidence provided that would suggest that a hierarchical class-system of centres does indeed exist'²³ and in the light of the foregoing consideration this was an appropriate comment. They therefore set out to conduct a rigorous test for the ranking of towns in Snohomish County, Washington. All the central

¹⁹ M. Palomaki (1964), 47.

²⁰ M. Palomaki (1964), 21. This is the standard correlation coefficient.

²¹ M. Palomaki (1964), 21.

²² M. Palomaki (1964) 110.

²³ B. J. L. Berry and W. L. Garrison (1958) Functional bases of the central place hierarchy *Econ. Geogr.* 34, 145.

trade and personal service, amusements, transportation, communication, utilities manufacturing, professional services and government. There are clear parallels with Smailes's procedures both in their strength and weaknesses and also an indication of the direction of future work. Many interested in the concept of town rank were fully aware of the technical drawbacks to the work of Smailes and Brush and accordingly a series of schemes were advanced to offset them

a The inclusion of all city facilities rather than an arbitrary selection

This is implicit in the very extended list of facilities used by Brush but the attempt to be totally inclusive presented great difficulties in terms of data collection. At the same time problems of equivalence presented themselves for in any unweighted count of retail facilities a large central jeweller could be equated with a corner newspaper shop as just one retail establishment. Floor space and turnover which can be used for weighting are rarely available in the detailed form that would make them valuable.¹⁶ The compacting of shops into groups, as for example 'convenience goods' and 'shopping goods' can offset this to some extent, but again a series of arbitrary decisions has to be made in the process.

b More rigorous procedures in the identification of ranks

The first stage was that the identification of ranks was made more objective by the awarding of points for certain facilities present so that a score was obtained for each town. These scores were then analysed to identify groupings that might occur. However, in most cases the groupings were defined arbitrarily with little attempt being made to identify linkages or to compare in group or between-group distances. The main exception to this was the work of Mauri Palomäki¹⁷ in the South Bothnian area of Finland. Centrality was measured in two ways. The first was in quantitative terms 'simply on the basis of the number of types of central function occurring in' the towns.¹⁸ For this, the totality of functions was broken down into separate elements, thus administrative, wholesale, retail, medical and public health activities were examined separately. For each, number of functions per settlement was plotted against each settlement and by inspection groupings were identified, these are called indicator groups. 'The internal uniformity of the indicator groups is estimated by calculating the standard

¹⁶ W. K. D. Davies (1967) Centrality and the central place hierarchy *Urban Stud.* 4, 63.

¹⁷ M. Palomäki (1964) The functional centres and areas of South Bothnia Finland *Fennia* 83, 1.

¹⁸ M. Palomäki (1964) 21.

functional classification, involved the use of multivariate techniques²⁴ A good example is the work of Abiodun on Nigeria²⁵ She includes all settlements in her study, not a preconceived selection which has been designated urban These are assembled into an array of settlements against numbers of central functions, which are arbitrarily weighted, and this is converted into a correlation matrix of the occurrence of each of the functions against all the others where 1 is self correlation or complete correlation and 0 mutual independence From this, and by means of high correlation, the elements of a 'trait complex' could be identified by abstracting those functions highly correlated In order to examine whether such parsimony is possible this matrix is then subjected to a principal component analysis in which the first component accounts for 52.735 per cent of the variation and the second 15.279 per cent, so that some 68 per cent of the variation is accounted for by the first two components

The very real problem in this sort of analysis is however to interpret the derived component in terms of the original variables In this case there is no simple solution since none of the variables loads strongly on the first component which is consequently interpreted as giving weight to the overall general importance of settlements The second component gives greatest weight to economic and administrative functions The process is continued by the abstraction of successive components which are then used as a basis for grouping

One of the most valuable aspects of component analysis is that it is possible to obtain assessments of each of the original units of measurement, i.e. the settlements, on scales of scores for each of the derived components To these an objective grouping procedure is adopted which purports to measure 'functional distance' between settlements or, in different terminology, to identify a hierarchy, if it exists It is not clear whether the number of groups was derived from the data or predetermined,²⁶ for the significant statement is made 'a good knowledge of the area under study greatly facilitates such an identification'²⁷ One wonders why this is so if all the procedures are impersonal, such a statement could well have been written into Smailes's 1946 paper Mrs Abiodun eventually identifies five distinct levels of settlement in her study and therefore supports the concept that towns are sorted

²⁴ See B. J. L. Berry, H. G. Barnum and R. J. Tennant (1964) Also B. J. L. Berry and H. G. Barnum (1962) Aggregate relations and elemental components of central place systems. *J. Reg. Sci.* 4, 33.

²⁵ J. C. Abiodun (1967) Urban hierarchy in a developing country *Econ. Geogr.* 43, 347

²⁶ J. C. Abiodun (1967), 358.

²⁷ J. C. Abiodun (1967), 362

place functions were considered which could be identified, though they were dominantly commercial in character. These were divided into variates of which there could be more than one in each centre, and attributes where by definition, there *could* only be one e.g. public library. Each of the variates was analysed by means of a scatter diagram of number of shops against population. Best fitting exponential curves were fitted to each diagram so that it was possible to identify the population necessary for each type of shop to appear. In the terms of the last chapter, the threshold populations were identified. These threshold populations were then tested for randomness by a χ^2 test and shown to be more even than random. Then, using the criterion that every member of a group should be closer to some other member than to any other outside the group, three groups of functions were identified. The attributes were analysed by calculating correlations with population totals of the centres in which they were found and then ranking them in ascending order of these coefficients. Tests of significant differences between these coefficients revealed that all but one fell into three groupings. Finally the two sets of threefold groupings were shown to be associated so producing three classes of central place.

Berry and Garrison claim that their method is capable of being reproduced in other areas and at levels of the central place hierarchy other than the universe of small centres considered. But difficulties arise if this is attempted. The use of centre population rather than tributary area population will only work in a rural area where there are no disturbing elements. The thresholds identified are not *real* thresholds in any sense since the populations of the surrounding rural areas are excluded. It would be difficult to envisage this method being applied to a heavily industrialized area for the central place equipment of a settlement is related to the total tributary population, not the population of the centre itself and in an area where the population is distributed unevenly between the two at different places then real problems will arise. As it is, and even in this selected area, the paper ends with explanation of some marked deviants because of such difficulties. Likewise where large towns are involved, the simple enumeration of stores becomes a large task and problems associated with what is being counted occur, this is the establishment-unit-outlet dilemma which has already been outlined. Berry and Garrison's work in Snohomish County is of real importance in that for the first time a rigorous, objective analysis of well defined data showed that distinctive hierarchical levels did occur. But the extension of this method to other areas presented problems which meant that little duplication has taken place to provide a series of comparative studies.

Subsequent refinement of techniques has, in this sphere, as in that of

If there are 23 grocers in settlement A then the centrality value for this function in the settlement is 0.5×23 or 11.5. If there are only two large department stores in the area then $C = 50.0$ and if one of these is in A then the centrality value contributed is 50.0. The total of the centrality values, that is $11.5 + 50.0 + n$, gives the functional index which is used as the basis for ranking.

A weighting for numbers of employees or floor space can be introduced to allow for variation in size of outlet. This process is fairly simple and gives the basis for an effective study of grouping. Its main drawback is that it presupposes a closed system which is clearly not the case, not even where it is used in a South Wales mining valley, where owing to physical conditions there is a high degree of isolation.

While attempts at identifying the hierarchy of towns through their establishment or facilities were becoming increasingly sophisticated, a similar process was characteristic of attempts to examine the ranking of towns not by direct but by 'indirect' means. If the status of a town were a reflection of its dominance over the surrounding area, then it could be argued that the degree of dominance could best be measured by some assessment of the strength of the area-town link. Indeed, Christaller adopted this interpretation in his measure of centrality.²²

$$Z_c = T_c - E_c \frac{T_c}{E_c}$$

where T_c = number of telephones in the central place, E_c = population of the central place, T_r = number of telephones in region, E_r = population of region. So that T_r/E_r is the ratio of telephones to population in the region which, multiplied by the population of the central place, gives an expected total if the distribution of telephones was even. This subtracted from the actual central place total gives a measure of centrality (Z_c) which is the relative concentration of telephones in the central place. It is true that Christaller used the physical presence of an instrument and not the number and direction of calls, so that he was measuring a ratio of appliances rather than communication flows but it was an apt choice at an early period and one when the telephone was not as ubiquitous as it is at the present time.

The concept of flows between town and country had been at the core of the earlier pre-Christaller work of Galpin²³ and Kolb²⁴ but it

²² W. Christaller (1966) 143-50.

²³ C. J. Galpin (1915) *The social anatomy of an agricultural community*. *Can. J. agric. Exp. Stat. Res. Bull.* 34.

²⁴ H. J. Kolb (1923), *Service relations of town and country*. *Can. J. agric. Exp. Stat. Res. Bull.* 58.

into distinct grades by the way in which they serve the surrounding area

It is not improper at this stage to question whether the application of these complex procedures, possible only with the use of modern high speed computers, is fully justified. However collected, the data tend to be crude and very variable in form. Thus Abiodun writes, 'the data on urban retail shops are not available and are very difficult to collect'. The distribution of representative retail company stores has been used.²⁸ Thus not only are the data preselected but the use of the word 'representative' emphasizes the point—by whom are these thought to be representative and on what grounds? Again an arbitrary weighting device for the services used in the study is introduced to be a measure of quality rather than quantity (see Palomäki, page 97). It is argued that there is no reason, with or without this, 'why the same order of hierarchy should not reproduce the choice of a measure will however affect the ease with which groups of the hierarchy are identified'.²⁹ This immediately indicates that a hierarchy is to be derived and will be better defined if such a device is used, we are back to the arbitrary subjective decision for which Smiles was criticized in 1946. Given the consistent problem of subjective decision there is much to be said for a simple but effective measure such as that used by Davies in South Wales.³⁰ A location coefficient of a single outlet of any functional type was determined by the formula

$$C = \frac{t}{T} 100$$

where C was the location coefficient of function t , t was one outlet of function t and T was the total number of outlets of t in the whole system. Multiplication of the relevant location coefficient by the number of outlets of each functional type present in a settlement gives the degree of centrality (centrality value) imparted to each settlement for every different type of function. A functional index is derived by the addition of all the centrality values attained by any settlement.³¹ Thus if there are 200 grocers in the area examined, the location coefficient is

$$C = \frac{1}{200} \times \frac{100}{1} = 0.5$$

²⁸ J. C. Abiodun (1967), 351

²⁹ J. C. Abiodun (1967), 354

³⁰ W. K. D. Davies (1967) Centrality and the central place hierarchy *Urb. Stud.* 4,

61

³¹ W. K. D. Davies (1967), 63

Matrix of number of messages between city pairs
To City

		a	b	c	d	e	f	g	h	i	j	k	l
From City	a	0	75	15	20	28	2	3	2	1	20	1	0
	b*	69	0	45	50	58	12	20	3	8	35	4	2
	c	5	51	0	12	40	0	6	1	3	15	0	1
	d	19	87	14	0	30	7	6	2	11	18	5	1
	e*	7	40	48	26	0	7	10	2	37	39	12	6
	f	1	6	1	1	10	0	27	1	3	4	2	0
	g*	2	16	3	3	13	31	0	3	18	8	3	1
	h	0	4	0	1	3	3	6	0	12	38	4	0
	i	2	28	3	6	43	4	16	12	0	98	13	1
	j*	7	40	10	8	40	5	17	34	98	0	35	12
	k	1	8	2	1	18	0	6	5	12	30	0	15
	l	0	2	0	0	7	0	1	0	1	6	12	0
Column Total		113	337	141	128	290	71	118	65	202	311	91	39

Largest flows bold Largest flow determined by the number of out going messages

* Largest flow from these cities is to a smaller city where size is determined by the column totals

In the matrix of messages the total in message flow the column totals, is a measure of centrality and can be used to rank the centres. The rows indicate flows from centres. A centre is independent if its largest flow is to a smaller centre. Using this property and the principles of transitivity (if a city *a* is subordinate to a city *b* and *b* is subordinate to *c* then *a* is subordinate to *c*) and that a city cannot be subordinate to any of its subordinates a graph can be constructed as below

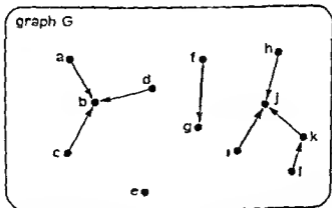


Figure 6-1: Graph of a nodal structure of a hypothetical region After J. D. Nystuen and M. F. Dacey (1961)

was taken up mainly by Green³⁵ and Carruthers³⁶ in Britain. In the first instance, it was mainly concerned with defining spheres of influence³⁷ but subsequently Carruthers produced a ranking of towns based on the operation of motorbus services. It was argued that 'bus traffic is especially useful as a means of giving some indication of the nodality of any centre. The bus operators have discovered "by a process of trial and error where the majority of persons wish to make the majority of journeys" ³⁸ A diagram was constructed of 'total number of buses on market days or Saturdays' entering a centre against 'percentage of those buses serving smaller places exclusively'. Towns were located on this and a classification into grades developed by inspection. This was a crude and unsophisticated method but it was a precursor of the present interest in graph theory as a means of ranking centres. This has been developed by Nystuen and Dacey³⁹ who argue that 'a hierarchy of cities may be reduced to an abstract network of points and lines. The points represent the cities while the lines represent the functional associations. Though a myriad of lines exists in the network, there is present a basic structure of strongest associations which creates the nested nodal regions and the hierarchy of cities ⁴⁰ The basic principle is that 'functional association' may be measured by flows between centres (of people, or communications of any form). These can be assembled into a matrix as illustrated below in figure 6-1, from which the nodal structure can be abstracted. This structure can be used to distinguish groups of cities that have maximum direct linkages and the rank order of these cities can be calculated. The extension of graph theory to *indirect* associations involves further adjustments of the raw data matrix but once this is done, it is possible by these techniques to 'divide a set of cities into sub-groups which specify a central place and its subordinate hierarchy' ⁴¹ The data most easily accessible and used in this context are telephonic communication data and this reversion to Christaller's original choice of data field is both interesting and significant. An example showing this worked out for Wales by Lewis and Davies⁴² is illustrated in figure 6-2

³⁵ F. H. W. Green (1950) *Urban hinterlands in England and Wales* *Geogr. J.* 116

³⁶ I. Carruthers (1957) *A classification of service centres in England and Wales* *Geogr. J.* 123, 371

³⁷ See page 107

³⁸ I. Carruthers (1957)

³⁹ J. D. Nystuen and M. F. Dacey (1961) *A graph theory interpretation of nodal regions* *Pap. of Reg. Sci. Assoc.* 7, 29

⁴⁰ J. D. Nystuen and M. F. Dacey (1961), 31

⁴¹ J. D. Nystuen and M. F. Dacey (1961), 41

⁴² W. K. D. Davies and C. R. Lewis (1970) *Regional structures in Wales: two studies of connectivity*, chapter 2 in H. Carter and W. K. D. Davies, editors (1970) *Urban essays: studies in the geography of Wales*, 22-48 (London)

It will be apparent from the foregoing discussion that nothing like consensus exists as to the method for examining whether a hierarchical structure exists and for the identification of city ranks. As with the analysis of town functions the use of component analysis has made a significant advance possible in objectivity and it would seem that for the moment in that area together with the use of graph theory, that most promise lies.

In the first chapter it was noted that, according to Davies, there were three perspectives from which the elements of urbanism could be viewed. The first of these was the static structure and, to a large extent, this has been the concern in this chapter, for a ranking of towns reveals a static structure of graded nodes. The third perspective, dynamic process has been briefly introduced in chapter 3 and will be taken up again. The second perspective is that of the connectivity of the parts or of the movements and flows of people and goods between the nodes which has already been partially introduced into the problem of ranking the nodes. This immediately leads to the notion of the 'field' within which these flows are taking place and so to the problem of what Christaller called the 'complementary region', but which is now usually termed the 'urban sphere of influence'. At this point it should be emphasized that no town has 'a' sphere of influence for in reality every good and service offered will attract purchasers from different areas. The assumption is required that certain functions will become associated in distinctive complexes, each complex in turn associated with a fairly clearly marked grade or rank in the hierarchy, for the concept of a sphere of influence to become meaningful. Even so a

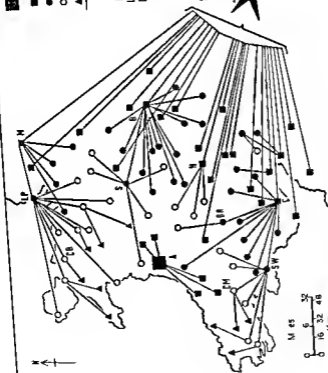
Figure 6-2. The nodal structure of Wales from trunk telephone call data. After C R Lewis in Carter and Davies (1970)

In this figure the ranks are based on the maximum outgoing calls: a centre being ranked above those centres which are subordinate and below the centre to which its calls are directed. Thus chains of call links can be traced from the lowest ranked centres through the intermediaries to London. Aberystwyth however stands outside this linked system and is therefore ranked as a first order centre. This is a particularly interesting indication of the small discrete area on the west coast and confirms the anomalous ranking given to the town intuitively by Smiles in 1946. Compare the situation of centres *e* and *g* in figure 6.1. The data are only for non contiguous telephone areas in the Wales and Border region so that cities outside the area are greatly under measured only their links with Wales being included e.g. Liverpool.

FIRST ORDER
SECOND ORDER
THIRD ORDER
FOURTH ORDER
FIFTH ORDER



L London
A Aberystwyth
M Manchester
LP Liverpool
CB Colwyn Bay
B Birmingham
S Shrewsbury
H Hereford
C Cardiff
SW Swansea
CM Carmarthen
BR Brecon



INDIRECT AND DIRECT SPATIAL GRAPH

indicated. It would be meaningless to resolve these lines into *one* sphere by any such method as identifying a median between the maximum and minimum areas, for at least two spheres are identifiable, an inner intensively dominated one and an outer extensive sphere with a possible intermediary area between, indicating the town operating at three hierarchical levels. This method was and is a quick and useful one but it is open to the same sorts of criticism as the selection of the indices for a 'trait complex', the choice is arbitrary and often an ill-considered rag bag of areas is assembled. It would be no easy task to justify the seven criteria chosen for the map of Aberystwyth and a selection of seven others might possibly present a very different picture. The resolution of all or some of the variations into one median line, to imply a sphere at a selected level, has no logical basis, for it quite unjustifiably assumes that a certain selection of lines has some form of real association, which in turn rests on the fact that they are related to the operation of a town at that level which has already been partly predetermined by the choice of criteria.

Since the sphere of influence is established about the town, one might well argue that the approach to its definition must be the reverse of that of ranking the town and, therefore, the attempt at defining the sphere from within the town is an indirect method. More profitable has been the second group of methods which have sought to identify areas within which movement to centres is taking place. Here the earliest methods were by examining the physical movement of vehicles, particularly buses.⁴⁵ A flow diagram of bus services produced a visual pattern of movement into (and out of) a centre and by inspection, a sphere of influence could be delimited. Apart from the fact that the private car now carries a large share of this movement, the crudity of the method meant that while quick and easy, it was not acceptable at a rigorous level of investigation.

Most contemporary work uses a method which is a variation on that introduced by Bracey in 1953.⁴⁶ A questionnaire is drawn up which aims to elicit the usual place at which a standard array of goods and services is obtained. Three difficulties immediately arise, all of which are implicit in the last sentence.

- 1 How is the sample of population to answer the questionnaire chosen?⁴⁷ There is little doubt that consumer behaviour will vary

⁴⁵ F. H. W. Green (1950). See also S. Godlund (1956) *Bus services in Sweden*, *Lund Stud. Geogr. Series B: Human Geography* 17.

⁴⁶ H. E. Bracey (1953) *Towns as rural service centres* *Trans. Inst. Br. Geogr.* 19, 95.

⁴⁷ For some comments on the construction of questionnaires in geography see S. R. Cowie (1968) *Question construction for behavioural research* in IBG urban studies group *Techniques in urban geography*, 1 (Salford conference).

town will have many spheres of influence, each corresponding to levels in the hierarchy at and below that of the level of the town concerned. In the characteristic American sequence of hamlet, village, town the town will have its own sphere of influence together with the spheres where it functions at the lower level of village and hamlet. All this is implicit in the theoretical discussion in chapter 5, but it does need repetition in the light of many studies which claim to delimit the sphere of influence of a town. No such thing exists without appropriate qualifications as to the level at which it is being considered. Some problems associated with central place theory and consumer behaviour will be considered in the next chapter, but it must be briefly noted here that the whole notion of the sphere of influence rests on the assumption that people will travel to the nearest place at which a good or service is available, whereas the increasing mobility of populations has made them much more footloose. Spheres of influence are generalizations of movement not neat, compact and determining bounds.

There have been two approaches to the identification of urban spheres of influence. The first has looked outward from the town in order to identify the various areas which are served by it. The second has looked inward from the countryside and has been more concerned with consumer behaviour and the way in which people use the various centres. Given the general trend of interest in central place studies toward consumer behaviour the second approach has become dominant but a brief review of the earlier method can be considered first.

Early attempts at defining urban spheres of influence were closely associated with Smailes's 'trait complex' for if the elements of that complex defined a 'fully fledged (i.e. a particular rank or grade of) town then the areal extent which those elements dominated delimited the urban sphere of influence'.⁴³ Moreover, if they were associated within the town then the areas over which they extended their influence should also coincide. 'It is usually found that the fields shown by various indices group themselves sufficiently to allow broad recognition of composite fields at a series of functional levels which correspond to the more clearly defined ranks of the urban hierarchy'.⁴⁴ The procedure, therefore, was to plot the areas which the selected criteria covered for example the area from which a bank drew its customers, a hospital its patients, a cinema its clients, a school its pupils and a local newspaper its readers. An example of this method is given in figure 6-3 where the boundaries of seven selected functions exercised from Aberystwyth are

⁴³ A. E. Smailes (1947) The analysis and delimitation of urban fields *Geogr.* 32

⁴⁴ A. E. Smailes (1947) 151

with such characteristics as income, social class, possession of a private car and place of work. Properly the sample should be stratified according to characteristics such as these, but since basic data are lacking it is seldom possible to do this in a systematic way, although questions as to occupation of household head and possession of a car and so on can be asked and used later as variables. The selection of respondents is usually, therefore, quite arbitrary, but with an attempt to obtain a fairly uniform ground coverage. Rowley⁴⁸ in a study in Wales obtained five completed questionnaires from each quarter kilometre grid square on the British Ordnance Survey map. If an adjustment to population is made, so that a given percentage sample is obtained, then the task is very great indeed, and also very monotonous. There are inherent problems in selecting respondents even from electoral registers or other lists and these are seldom overcome, except in very small scale studies where the behaviour of specific groups is the prime purpose.

- 2 How is the standard array of goods and services determined?
C. R. Lewis⁴⁹ in a study of only the small towns of mid Wales

⁴⁸ G. Rowley (1967) *The middle order towns of Wales* (University of Wales Unpublished Ph.D. thesis)

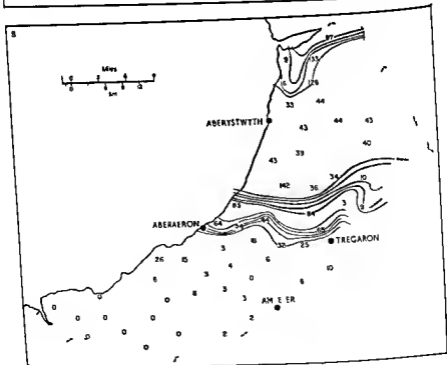
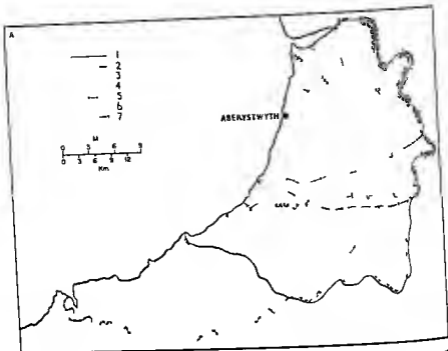
⁴⁹ C. R. Lewis (1970) The central place patterns of mid Wales and the middle Welsh borderland chapter 10 in H. Carter and W. H. D. Davies editors (1970) 228-68

Figure 6.3 The urban sphere of influence of Aberystwyth as revealed A by an arbitrary array of criteria and B by questionnaire survey

In the upper map the criteria are

- 1 An Insurance Company's Office Area
- 2 Baker's Delivery Area
- 3 Agricultural Co-operative Delivery Area
- 4 Bank Area
- 5 School Catchment Area
- 6 Postal District
- 7 Veterinary Surgeon's Area

On the lower map the area of maximum purchase for twelve goods and services was asked of twelve people randomly selected for each kilometre grid square of the British Ordnance Survey map. The replies nominating Aberystwyth were summed for each square and used as spot heights in drawing isopleths. Note that although the bases were very different there is a correspondence between the two maps.



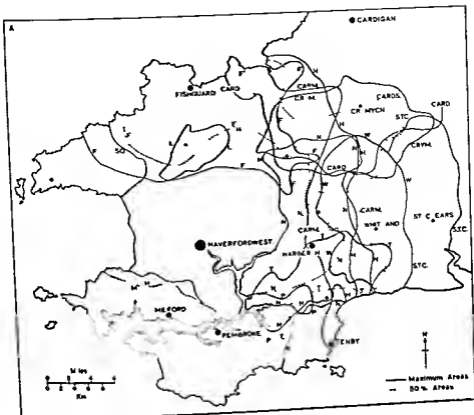


Figure 6-4 A Maximum and fifty per cent areas for towns in southwest Wales. The initial letters refer to the centres B The fifty per cent trade areas and areas visited for weekly shopping After G Rowley (1967)

identified 157 different functions. To put all these on a questionnaire, which is to be completed by large numbers of people, is not practicable and some selection *has* to be made. Rowley⁵⁰ in the study noted above used 20 goods and services, and attempted to range these over high order and low order categories. But whatever is done the selection remains subjective and arbitrary.

- 3 What is meant by 'usual place of purchase'? Attempts can be made to refine this by defining it as the place at which the largest expenditure was incurred over the period of a week or longer, or just the last place of purchase can be recorded. Again a measure of vagueness can creep in where the respondents are faced with providing an instant answer from recollected actions.

There is a solution to the last two difficulties and this is to have selected respondents keeping a complete account of the place and amount of all purchases over a given period, a complete diary of expenditure. This solution increases the difficulties of selecting the sample to an enormous extent and can only be used when answers to specific hypotheses as to consumer behaviour are required, and not a general interpretation of urban spheres.

Once the questionnaires have been completed the procedure is straightforward. For each of the central places a point is awarded each time it is nominated as the place of purchase of a good or service. Each questionnaire cannot be treated as an isolated spot score since individual eccentricities have to be eliminated. A number of questionnaires are, therefore, totalled, for a given grid square on a map, for an administrative area or for an arbitrarily defined settlement. In Rowley's study five questionnaires for every quarter kilometre square meant that, with 20 goods and services on the sheet, a total of 100 answers was obtained each nominating a centre used. In this case these could be treated directly as percentages and these scores can be used to denote the patterns of affiliation. Isopleths can be interpolated and it can be maintained that

- 1 The 50 per cent isopleth for any centre will indicate the point at which a settlement loses dominance.
- 2 The bunching of isopleths at any point will indicate a sharp change of gradient and the limit of a sphere of influence related to a bundle of functions at a given rank in the hierarchy.
- 3 The 1 per cent isopleth will mark the absolute limit of a settlement's influence.

An example of this sort of exercise is given in figure 6-4.

⁵⁰ G. Rowley (1967)

perceive the environment, in terms of town centres, that determines the pattern, and not necessarily the other way round. Classical central place theory often gives the impression of a deterministic, rigid structure, established on the day of creation to which mere mortals have no option but to conform, but on the other hand a given system exists to be perceived in a variety of ways. This introduces qualifications which can be set aside to the next chapter.

One further matter needs to be considered at this stage. Although many investigators have sought by the complex methods here set out to rank towns into hierarchies, there has been a sad lack of the adaptation of these methods for the analysis of historical data and until this is done one could well argue that studies of dynamic process in the city system are all inadequately based. It is not without a degree of amusement that one notes the abandonment of very elaborate ranking procedures immediately the past is considered and the use of simple population totals. Either the sole use of population figures is totally inadequate in historical contexts or a great deal of time and effort is being wasted at the present.⁵¹ Fortunately, there are examples of studies which attempt to establish hierarchies in past times by using data which are usually gathered from contemporary directories.⁵² In a British context, however, these do not become available until the end of the eighteenth century and before this there is little that can be used other than the descriptive accounts of travellers⁵³ or, reverting to population totals, the sorts of figures that can be derived from the hearth tax. Lucy Caroe has presented an attempt to employ 'association analysis' on nineteenth-century East Anglian data.⁵⁴ This work effectively displays how contemporary quantitative analyses can be employed in considering historical data. But the real problem arises in converting this static analysis of 1846 information into a series of analyses over time. Here the functional index devised by Davies is simpler and has many advantages. The real problems that remain are best revealed by C. R. Lewis in a study of mid Wales.⁵⁵ Owing to variations in information available different sets of towns have to be taken into account at each date so that it is necessary to recalculate centrality values and functional indices for different sets of towns at

⁵¹ W. K. D. Davies, J. A. Goss and D. T. Herbert (1968) Directories, rate books and the commercial structure of towns. *Geogr.* 53, 41.

⁵² H. Carter (1955) Urban grades and spheres of influence in south-west Wales. *Scott. Geogr. Mag.* 71, 43.

⁵³ L. Caroe (1968) A multivariate grouping scheme 'association analysis' of East Anglian towns in E. G. Bowen, H. Carter and J. A. Taylor editors (1968) *Geography at Aberystwyth*, 253 (Cardiff).

⁵⁴ C. R. Lewis (1970), 228.

To some extent the problems inherent in formulating a questionnaire with an array of goods and services can be offset by a less discriminating but simpler method. This is to find out the frequency of visits to shop at the various centres ranged on a standard scale (such as weekly, monthly and less frequently than monthly) or absolutely over a given period. These data can then be plotted directly (see figure 6-4b) or can be used to identify an ordering of flows. Davies and Lewis⁸¹ have presented a study in this form where the raw data were aggregated to give flows from each settlement to Swansea in the two weeks previous to the survey. The flows were ranked in relation to the centres receiving them. First order and second and third order flows to Swansea were in this way identified and mapped (figure 6-5) and from these patterns it is possible to demonstrate Swansea's sphere at two levels, the metropolitan level, where it dominates a well defined city region, and a 'town' level, where it functions at a rank comparable with its largest neighbours, such as Llanelli or Neath.

One last point needs to be added at this stage. The exercises above present the most general of pictures and conceal the great variations in consumer behaviour. A brief example may be cited. Nader in a study in Durham investigated shopping habits in Penshaw, a former mining settlement some five miles from Sunderland.⁸² Within Penshaw he contrasted the shopping orientation of households on a new private housing estate with that of the remainder of the ward. The results of the enquiry into the purchase of weekly groceries is shown in table 6-1.

table 6-1: Purchases of weekly groceries *After G. A. Nader (1968)*

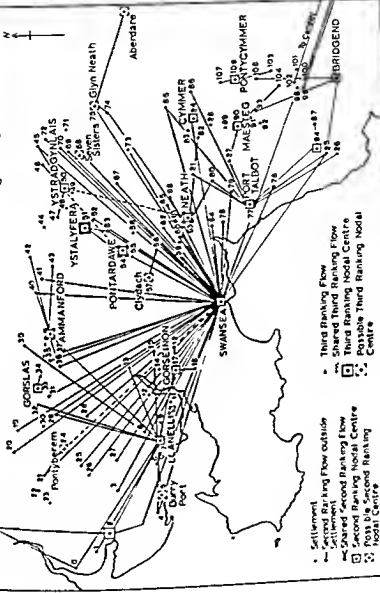
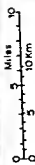
Place of purchase	Per cent purchased	
	Penshaw estate	Rest of ward
Sunderland	34.6	2.9
Local	53.0	76.4
Mob le shop	2.7	10.7
Other centres	9.7	10.0

They show markedly the different orientation which, apart from relations with income and occupation, is linked to such variables as previous place of residence of households, the working status of the wife and the workplace of working wives. This brief consideration of shopping habits indicates that in reality the situation is far more complex than even the most complex interpretation of an urban hierarchy and spheres of influence indicates, and that it is the way people

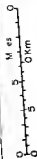
⁸¹ W. K. D. Davies and C. R. Lewis (1970), 36-7.

⁸² G. A. Nader (1968) *Private housing estates: The effect of previous residence on workplace and shopping activities*. *Ta Plains Rev.* 39, 65.

D CARMARTHEN



- Settlement
- Second Ranking Flow outside Settlement
- Shared Second Ranking Flow
- ◻ Second Ranking Nodal Centre
- ◻ Possible Second Ranking Nodal Centre
- Third Ranking Flow
- Shared Third Ranking Flow
- ◻ Third Ranking Nodal Centre
- ◻ Possible Third Ranking Nodal Centre



CARMARTHEN

AMMANFORD

PONTARDUN

YSTALYFERA

CYDACH

NEATH

PONTYCYMMER

MAESTEG

PORT TALBOT

SWANSEA

GORSENON

LLANELLY

BURRY PORT

KIDWELLYN

GYN NEATH

PORTHCAWL

BRIDGEND

- Settlement
- First Ranking Flow out of Settlement
- Shared First Ranking Flow
- Nodal Centre
- Possible Nodal Centre

Figure 6.5A

disposed on the earth's surface, the models of Christaller and Lösch are, therefore, hypotheses as to what will be found in reality. The physical scientist sets up his equipment to carry out the experiments relative to a hypothesis. This chapter has been concerned with a similar process in the social sciences. We do not set up equipment but it is essential to devise procedures so that a hypothesis can be effectively tested. This is by no means easy and indeed it is possible to present a case that the basic tenets of central place theory were established in 1939, the remaining thirty years have been devoted largely to the devising of effective techniques to test the theory in the real world and that with only a modicum of success.

Notes on further reading

The essential material is in the bibliographies cited in footnote 2 (p. 72) of the previous chapter. A paper of particular value is

DAVIES W. K. D. (1966) The ranking of service centres: a critical review (see footnote 2)

every date so that effective comparison becomes possible. Lewis converts the functional index for each settlement into a percentage figure of all the settlements of the whole area so that he obtains a measure of how all the towns shared the total 'servicing' of the region between them at different dates. It follows that meaningful comparisons of the centrality of different centres over time can be made. The urban hierarchy can in this manner be seen not as a static thing but as comprising relationships between towns that are constantly fluctuating and a sounder basis can be given to earlier studies which attempted to investigate this feature.⁸⁷

It is similarly possible to identify spheres of influence for past periods, but here the data are so severely limited that one is bound to work from the city outwards. At the same time, material of very varying character has to be used as it becomes available. Rodgers has used the location of the out-burgesses on the Burgess Rolls of 1542 to 1602 in order to derive the market area of Preston in the sixteenth and seventeenth centuries.⁸⁸ Newspaper advertisements have also been used as well as administrative areas for, after all, the very way in which many English counties were named after the central town indicates the use of the concept of a sphere of influence in very early times. Again the charters which were granted to medieval towns often specify the area within which people were to use the market of the chartered town and this also gives some indication of very early spheres of influence.⁸⁹ At a later date the journeys of carriers to market,⁹⁰ or of stage coaches, provide an equivalent of bus route analysis. It is apparent that a wide range of material is available for the geographer investigating the past. This material is fragmentary and there are very many difficulties in its employment, but a good range of preliminary work exists in considering the developmental process in the city system.

In terms of an effective academic enquiry a stage has now been reached where the results of experimentation can be assessed. In chapter 5 a number of assumptions were presented which sought to establish that certain regularities exist in the way in which cities are

⁸⁷ H. Carter (1955). Also H. Carter (1956) 'The urban hierarchy and historical geography', *Geogr. Stud.* 3, 85, reprinted in A. R. H. Baker, J. D. Hamshere and J. Langton editors (1970) *Geographical interpretations of historical sources*, 269 (Newton Abbot).

⁸⁸ H. B. Rodgers (1956) 'The market area of Preston in the sixteenth and seventeenth centuries', *Geogr. Stud.* 3, 45. Reprinted in A. R. H. Baker et al. (1970), 102.

⁸⁹ H. Carter (1969) 'Caernarvon', in M. D. Lovel, editor (1969) *Historic towns, maps and plans of towns and cities in the British Isles, with historical commentaries, from earliest times to 1890*, 5 (Oxford).

⁹⁰ H. Carter (1955), also P. R. Odell (1957) 'Urban spheres of influence in Leicestershire in the mid-nineteenth century', *Geogr. Stud.* 4, 30.

randomness. When there is complete absence of a systematic pattern of points in a specified region, the distribution of points is called random. A pattern that is not random is either more clustered than random or more uniform than random.⁴ Christaller's thesis unequivocally implies that the distribution of central places is uniform and that a situation 'more uniform than random' should be shown regardless of rank if all the central places of an area are analysed. Dacey demonstrated that, using Brush's data for southwestern Wisconsin,⁵ the system most closely approximated a random condition. From this three implications were drawn:

1. There was a hierarchy of central places in the area but the spatial distribution did not conform to central place theory.
2. A hierarchy did exist but had not been properly defined.
3. Central place theory did not apply to market towns in southwest Wisconsin.⁶

Taking into account the inadequate diagnostic basis of Brush's ranking, the third implication was at least possible. Later work by L. J. King⁷ was no more successful in identifying uniform lattice patterns. Using the nearest neighbour statistic (R_n), with $R_n = 0$ indicating a clustered situation, $R_n = 1$ a random situation and $R_n = 2.15$ a uniform lattice, King examined twenty sample areas and found that his results showed a range of $R_n = 0.7$ for an area in Utah to $R_n = 1.38$ for part of Missouri. Although a claim was made that some of the samples, such as the Missouri one quoted above, could be classified as 'approaching uniformity',⁸ the general conclusion must be that these patterns approximate to a 'random' condition. There have been later attempts to rescue an element of regularity from these apparently random distributions, such as that of Medvedkov using the concept of entropy. Entropy is a notion borrowed from the statistical theory of information. Entropy helps to measure disorder in settlement patterns, so that the random and uniform components are effectively separated and measured.⁹ This means that any settlement

⁴ M. F. Dacey (1962).

⁵ M. F. Dacey (1962).

⁶ W. Porter (1960).

⁷ L. J. King (1962). A quantitative expression of the pattern of urban settlements in selected areas of the USA. *Tijdschr econ soc Geogr* 50, 1. L. J. King (1961). A multivariate analysis of the spacing of urban settlements in the United States. *Ann Assoc Am Geogr* 51, 222.

⁸ L. J. King (1962).

⁹ Y. V. Medvedkov (1967). The regular component in settlement patterns as shown on maps. *Soviet Geogr* 8, 50. Y. V. Medvedkov (1967). The concept of entropy in settlement pattern analysis. *Pap Rüg Sts Assoc* 18, 163. For a brief study using the concept of entropy in which the procedure for its calculation is given see R. K. Semple and R. G. Colledge (1970). An analysis of entropy changes in a settlement pattern over time. *Econ Geogr* 46, 157.

7 SOME PROBLEMS ASSOCIATED WITH CENTRAL PLACE THEORY AND THE DISTRIBUTION OF TOWNS

1 PROBLEMS DERIVED FROM EMPIRICAL STUDIES

Christaller's study of central places in south-west Germany¹ was aimed at answering the question whether there were general laws which governed the size and spacing of towns. His model was designed to provide an affirmative answer by revealing the underlying regularity in town distribution. As chapter 6 has demonstrated, most early attempts at empirical investigation accepted Christaller's thesis as proven, and questioning neither his assumptions nor the logic of his argument, they set out to show its applicability to the real world. But these somewhat uncritical studies were soon to be paralleled by others which found little of the regularity which Christaller's model predicted.

The first challenge was directed at the point where central place theory seemed clearly inapposite. A cursory inspection of the distribution of towns in most areas of the world reveals no sign of a hexagonal lattice. If, obeying the demands of threshold and range, particular grades of towns were marked by characteristic assemblages or bundles of functions, they seemed most certainly not to display any regularity in distribution. The time lag before any serious work on this aspect of central place theory was undertaken was partly due to the fact that many investigators assumed it was self-evident that no such spatial arrangement appertained, and partly to the lack of adequate techniques for examining the distribution patterns. These were eventually derived from the investigations of plant ecologists, and a series of papers by Dacey² applied nearest neighbour analysis³ to town (central place) distributions. 'The central concept of nearest neighbour analysis is

¹ W. Christaller (translated by C. W. Baskin) 1966 *The central places of southern Germany* (Englewood Cliffs, NJ).

² M. F. Dacey (1962) 'The analysis of central place and point patterns by a nearest neighbour method', in K. Norberg, editor *IGU symp. Urb. Geogr. Lund 1960*, 55.

M. F. Dacey (1960) 'The spacing of river towns' *Ann. Assoc. Am. Geogr.* 50, 59.

M. F. Dacey (1964) 'Modified poisson probability law for point patterns more regular than random' *Ann. Assoc. Am. Geogr.* 54, 559.

M. F. Dacey (1967) 'Some properties of order distance for random point distributions' *Geogr. Annlr.* 49(b), 25.

³ For a comment see W. Porter (1960) 'Ernest and the Orophagians: a fable for the instruction of young geographers' *Ann. Assoc. Am. Geogr.* 50, 297-9.

location. Berry, along with other authors, turned to these problems first showing that the rank size relation and a hierarchical structuring

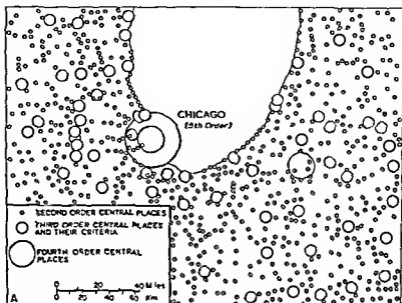


Figure 7-1 A, B & C: Functional organization in the north east United States After A. K. Philbeck (1957)

These maps indicate centres of progressive importance from the second order to the seventh order, which is New York. The individual pattern about a fourth order city, South Bend is shown in figure 7-1B. There is a pyramidal structure leading to the largest city at the apex. This is one of the basic principles of areal functional organization and carries the implication that a similar seven ordered structure can be identified outside this area and considered as universal.

were not incompatible¹⁸ and could be subsumed under the same system. The result depended largely on the analytical approach for, by adjustments, either situation could be revealed. Moreover it was

¹⁸ B. J. L. Berry and W. L. Garrison (1958): Alternate explanations of urban rank-size relationships. *Ann. Assoc. Am. Geogr.* 48, 83.

pattern is assumed to have a regular and a random component and the calculation of the entropy value is designed to disentangle these two parts, indicating the degree of disorder. This seems of comparatively little value and of questionable validity, in relation to a static distribution but may possibly be useful in assessing whether a distribution is becoming more uniform with time. But it is possible to conclude that in few areas can any element of regularity in town distribution be discerned. The concept of the hexagonal lattice therefore holds little value to the student of the real world whatever may be its attraction to the student of social and economic geometry.

At the same time the idea that ranks of towns universal to the western world were to be recognized, an implicit tenet of a paper by Brush and Bracey,¹⁰ was also becoming less tenable. Philbrick had attempted to demonstrate a seven-stage hierarchy of nested functions which was equated with seven broad categories of functional roles.¹¹ These provided the base pattern of areal organization as shown in figure 7.1. Carol used this same system in considering the central place system in its internal city context¹² although this involved the telescoping of three of Christaller's ranks into one called 'middle order'. This presumably corresponded with Philbrick's 'third order'. The detail of these schemes is not important here, but rather the idea that all settlements in all countries would neatly drop into their appropriate slots. But any attempt to define these 'slots' reveals the complete lack of agreement among the many empirical studies. After considering a summary statement in graphical form (figure 7.2)¹³ of some of these schemes one is forced to recall the conclusion of Lukermann that the result was a multiplicity of taxonomies rather than explanatory generalization.¹⁴ Moreover in the background of these classificatory studies was the 'rank size rule'¹⁵ which stated that empirical investigation in reality revealed not a stepped but a log-normal relationship between size of town (measured by population) and rank in the system.

This situation was greatly disturbing to urban geographers who in the early days had seen central place as a universal theory of town

¹⁰ J. E. Brush and H. E. Bracey (1966) Rural service centres in south western Wisconsin and southern England *Geogr. Rev.* 45, 559.

¹¹ A. K. Philbrick (1957) Principles of areal functional organization in regional human geography *Leon Geogr.* 33.

¹² H. Carol (1960) The hierarchy of central functions within the city *Ann. Assoc. Am. Geogr.* 50.

¹³ W. K. D. Davies (1964) *The hierarchy of commercial centres: a case study in South Wales* (University of Wales unpublished Ph.D. thesis). See volume 2, figure 3.1.

¹⁴ See chapter 3, page 39.

¹⁵ G. K. Zipf (1941) *National unity and diversity* (Bloomington, Ill.).

argued that any system was composed of two parts, one called *aggregative*, the other *elemental*¹⁷ 'At the aggregative level the blending of many varying, but locally homogeneous areas leads to the emergence

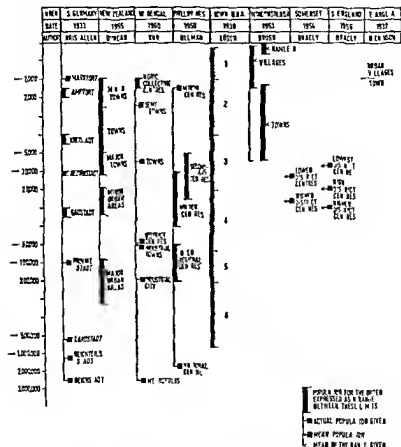


Figure 7-2 Comparative population sizes for various orders of central places some early studies *After W K D Davies (1964)*

of a continuum of centres. Within each small local area, the levels of the hierarchy are clearly represented. The theoretical postulate is that the levels of centres are a function of the grouping requirements of certain

¹⁷ B. J. L. Berry and H. G. Barnum (1962) Aggregate relations and elemental components of central place systems *J. Reg. Sci.* 4, 35

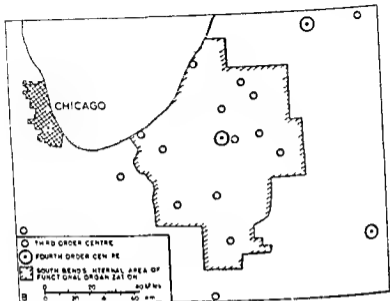


Figure 7-1B

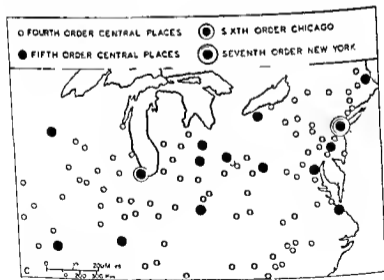


Figure 7-1C

between the two lies at the heart of any decision to patronize one retail store rather than another.²⁰ Thompson then argues that the sorts of phenomena which are to be explained, such as the distribution of retail sales, are 'the result of the summed reactions of many individuals, each free to make his decision as he sees fit given the perceived and real constraints with which he may find himself faced. Then, referring to Lynch's work on *The image of the city*²¹ which demonstrates the way in which perception of the urban environment varies between individuals, Thompson goes on to argue that the real key in retail research lies in behavioural studies 'the fundamental factor affecting the geographic distribution of retailing is the manner in which consumers organize their perceptions of the external environment with which they are faced'.²²

Two studies can be quoted which have illustrated this point. The first is that of Murdie, significantly titled 'cultural differences in consumer travel'.²³ Murdie studies consumer travel in an area of southwestern Ontario where there are two contrasted groups which he calls old order Mennonites and modern Canadians. The old order Mennonites form a relict element equivalent to the Amish or Pennsylvania Dutch peoples of the United States. They are the strictest preservers of the traditional ways. In a standard analysis in central place terms a series of regression analyses is carried out where the dependent variable is distance travelled to first choice centres and where a series of independent variables is considered such as the number of central functions in the first and second choice centres, frequency of purchase etc. The major explainer of distance travelled is the number of functions in the first choice centre in accordance with classical central place theory, but there are considerable differences between the two groups which are best illustrated by figures 7.3 and 7.4 showing contrasts in travel for purchases of clothing and yard goods. Here, whereas the outer range of modern Canadians increases with the size of centre visited for the Mennonites it does not for the outer range is fixed at six miles. The old order Mennonites still wear the same clothes as their ancestors who came to the country. They have no interest in fashion. They buy their clothes therefore locally at the nearest point. New fashions coming into an area reach the regional capital first and are thence diffused down the hierarchy so that the first contact of the

²⁰ D. L. Thompson (1966) Future directions in retail area research. *Econ. Geogr.* 42, 1.

²¹ K. Lynch (1960) *The image of the city* (Cambridge Mass.).

²² D. L. Thompson (1966), 17.

²³ R. A. Murdie (1965) Cultural differences in consumer travel. *Econ. Geogr.* 41, 211.

bundles of central functions. Or, in other words, that classifications of centres and functions exist in which interaction effects are highly significant.¹⁸ The last part of this statement is nothing more than a direct repetition of the argument by Smailes for the 'trait complex' though the statistical procedures in identification are objective and rigorous. But if the merging of these locally homogeneous areas is one reason why the hierarchy is obscured it also means that a clear limit is set to the universality of any ranking for it will be a product of the particular economic, social and spatial conditions of individual areas.

Berry takes this problem further.¹⁹ At the outset it can be demonstrated, as implied in the last paragraph, that local environmental constraints will act upon the system. Thus, for example, there is no direct relation between size of area and population density nor a simple expansion of area to compensate for falling density. It was observed that areas do expand as the density falls, in keeping with threshold demand, but the areas do not expand as fast as the densities fall so that the size of the population served falls. As a result, under these conditions, functions with the greatest threshold requirements at any level of the hierarchy move up to the next level, there is what Berry terms a phase shift.

If these several limitations are considered, it is apparent that the notion of a series of universal levels was over-optimistic and that the ranking of places is most meaningful within limited and local areas. To rank the towns of England and Wales is a useful descriptive device but has little meaning in central place terms because of the enormous variety of environmental conditions (using the word 'environment' in its widest and proper sense). The concepts of central place theory are invaluable in the analysis of the size and spacing, that is in the distribution, of cities but the uniform deterministic setting in which they are implied to operate bears little relation to actuality.

Further limitations of the notion of the hierarchy itself have been forthcoming largely through investigations in the field of market research. Here the viewpoint has been that of the individual consumer as opposed to the aggregate or bundle of establishments at a centre from which consumer behaviour has been extrapolated. Donald L. Thompson has maintained that all the geographical analyses, such as those discussed in this chapter, have a basic assumption which is 'that the decision maker corresponds to the "economic man" in that an objective analysis of revenues and costs, satisfactions and dissatisfactions, utilities and disutilities and the maximization of the differences

¹⁸ B. J. L. Berry and H. G. Barrow (1962), 46.

¹⁹ B. J. L. Berry (1967) *Geography of market centers and retail distribution* (Englewood Cliffs, NJ).

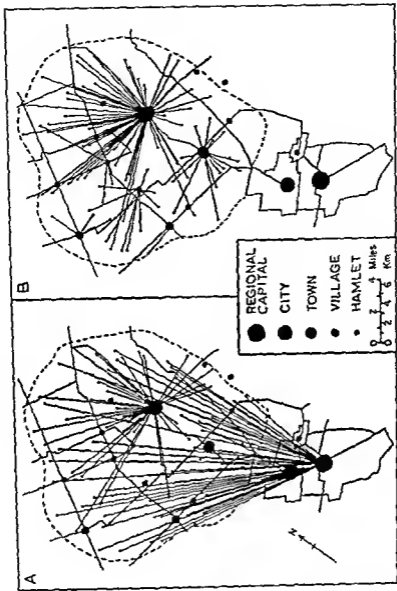


Figure 7-4: Cultural determinants of the journey to retail centres. The journey to shop for shoes **A**: Modern Canadians **B**: Mennonites After R A Murtie (1965)

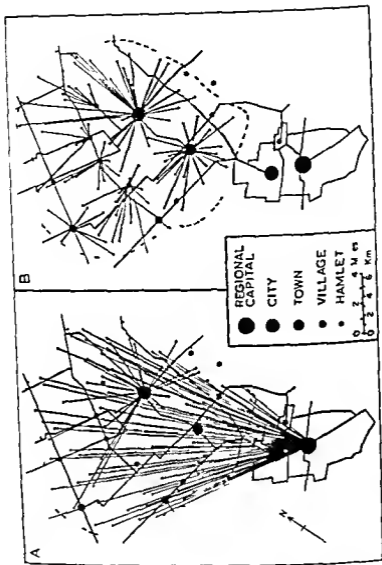


Figure 7.3 Cultural determinants of the journey to retail centres. The journey to shop for clothing and modern goods. **A** Modern yards and Mennonite centres. **B** Mennonite centres. After R. A. Murdoch (1965)

table 7-1: Rank correlation of functions by order of entry distance to maximum purchase town and distance to nearest purchase town Iowa data After R G Golledge G Rushton and W A Y Clark (1966)

<i>Function</i>	(a) Rank by order of entry	(b) Rank by distance to max purch town	(c) Rank by distance to nearest purch town
Car service	1	2	1
Food & drink away from home	2	5	5
Groceries	3	3	3
Church	4	1	2
Barber	5	4	4
Appliances	6	20	20
House fuel	7	6	6
Furniture	8	24	23
Variety	9	22	17
Building services	10	11	10
Drugstore	11	8	8
Physician	12	16	16
Car sales	13	23	24
Shoe repair	14	13	11
Dry cleaning	15	15	14
Movies	16	21	21
Food locker	17	7	12
Woman's clothing	18	19	22
Dentist	19	18	16
Jewelry	20	17	19
Men's clothing	21	10	9
Repairs to TV & appliances	22	9	7
Children's clothing	23	14	18
Sporting goods	24	12	13
		<i>a & b</i>	<i>a & c</i>
Kendall's Tau		23	32

countryside with the new fashions is in the largest city. But this whole process is meaningless to the Mennonite people. One could argue that their cultural inheritance has transformed a good from a high to a low order or one may conclude that the central place importance has virtually no effect on distance travelled by the old order Mennonites for these goods²⁴ and that 'socio-economic influences on relative mobility as these are reflected in differences in the levels of space preferences attained by different consumers, must be considered in more heterogeneous areas'.²⁵ Or, in other words, the perception of the consumer is a vital factor. This idea has been best developed in a series of papers by Rushton and others.²⁶ An investigation into the dispersed farm population of Iowa²⁷ was designed to consider the spatial behaviour of consumers by examining the assumption, implicit in central place theory, that people will travel shorter distances for those goods and services which occur with the greatest frequency. It is argued that the above assumption, together with the hypothesis that many goods and services have similar thresholds and ranges (i.e. trait complexes occur), is the rationale for inferring behaviour from the distribution and frequency of occurrence of central place functions. This in turn is the basis for the ranking of goods and services into distinct grades. The study deals with two sets of data, the distance of travel for maximum purchase and nearest purchase of thirty three goods. A considerable degree of flexibility in the purchase characteristics of some goods was shown by analysis of standard deviations from mean distances travelled, but the crux of the study was a rank correlation between order of entry of goods by distance to maximum purchase centre and by distance to nearest purchase town (table 7-1). The correlation coefficients derived were 0.23 and 0.32, neither of which were significant at the 0.01 level of confidence. It is apparent from this result that Iowans do not always make their maximum purchases at the nearest available location. A further attempt to group 'functions' by distances travelled for maximum purchase using standard statistical grouping procedures produces seven 'ranks' which do not provide a means of distinguishing the conventional functional contrast of the village, town and city. The conclusions of the study are that detailed

²⁴ R. A. Murdie (1965), 232.

²⁵ R. A. Murdie (1965), 233.

²⁶ R. G. Colledge, G. Rushton and W. A. Y. Clark (1966) Some spatial characteristics of Iowa's dispersed farm population and their implication for the grouping of central place functions. *Econ Geogr.* 42, 261. See also G. Rushton (1966) Spatial pattern of grocery purchases by the Iowa rural population. *Univ. Iowa Stud. Bus. Econ.*, New Series 9.

²⁷ R. G. Colledge, G. Rushton and W. A. Y. Clark (1966).

base i to shopping centre j , and λ is a parameter to be estimated empirically to reflect the effect of travel time on various kinds of shopping trips. If $P(C_{ij})$ is calculated for a series of points of origin (i) then isopleths, or equiprobability contours, can be drawn for each of the centres (j). A trade area can be identified by isolating points where the same equiprobability contours from different centres intersect.

2 PROBLEMS DERIVED FROM EXTENDED APPROACHES

But these attempts to move from deterministic to probabilistic interpretation although taking in consumer behaviour still assume the given pattern of central places and indeed make assumptions, such as the relevance of travel time or distance, which seems not to be confirmed by Rushton's work. Thus we are brought back to the problem of behaviour in relation to central places. One cannot assume that either one came first for behaviour patterns and the distribution of places are fundamentally interdependent and 'in the context of ongoing spatial processes, behavioural changes may call forth structural changes, as well as the converse'.³⁰ This situation creates critical problems for investigations which view central place systems independently of consumer behaviour, but equally it presents problems to investigations of consumer behaviour which accept a given distribution of central places in relation to which behaviour patterns are described.

The two elements which have been introduced into this chapter have provided the bases for much of the work derived from central place ideas, which has exercised geographers in recent years. These elements are the extension of the retail gravity concept to provide basic models for regional planning and the ever-deepening concern with a behavioural approach as explanation is sought by moving from the aggregate scale of central place theory to the level of the individual and the way he perceives and uses the city system. These two developments are briefly discussed below, although it must be recorded that each has an extensive literature which it is outside the scope of this volume to explore.

a Aggregate models derived from central place principles

Regardless of the divergence of individual actions from those predicted by the central place model, orders of towns can be effectively identified and the operation of the constraints of threshold and range remains meaningful at the general scale. At such a scale, therefore, the tenets of the model may be used for prediction and hence for planning, much of

³⁰ B. J. L. Berry (1968) A synthesis of formal and functional regions using a general field theory of human behaviour, part IV, chapter 3 of B. J. L. Berry and D. F. Marble, editors (1968) *Spatial analysis* 420 (Englewood Cliffs NJ)

information on expenditure patterns deduced from the occurrence of functions, does not agree with direct interview results, and that 'the grouping of central place functions on the basis of travel behaviour produces a different ordering of functions than grouping on the basis of occurrence of functions'.²⁸ This type of study leads to the sort of impasse with which the preceding chapter concluded. Rushton writes 'Central place theory is only one of the many areas of human geography where assumptions about the spatial behaviour patterns of individuals are incorporated in explanations of spatial structure'.²⁹ This is a 'chicken and the egg' type of problem, which comes first the city system or the patterns of behaviour of individuals? At this point it is worth introducing the work that has been carried out to place the definition of shopping trade areas, or urban spheres, on a basis more in line with consumer behaviour. The earliest attempts were simply deterministic and formulated in the terms of gravity models. The most well known is Reilly's Law of Retail Gravitation which is usually given in the form

$$Bb = \frac{Dab}{1 + \sqrt{\frac{Pa}{Pb}}}$$

Where Bb is the break point between city A and city B in miles from B, i.e. B's sphere of influence, Dab is the distance between A and B in miles, and Pa , Pb are the populations of A and B respectively. Huff was responsible for restating this in probabilistic terms on the basis that the likelihood of a consumer going to any centre is based on the number of items required and the effort and expense which he has to make. From these two variables Huff derived an expression

$$P(C_j) = \frac{\frac{S_j}{T_j^2}}{\sum_{j=1}^n \frac{S_j}{T_j^2}}$$

Where $P(C_j)$ is the probability of consumer at a given point of origin i travelling to a given shopping centre j , S_j is the area of selling space devoted to the sale of a particular class of goods by shopping centre j , T_j is the travel time involved in getting from a consumer's travel

²⁸ R. G. Colledge, G. Rushton and W. A. Y. Clark (1966)

²⁹ G. Rushton (1969) *Analysis of spatial behaviour by revealed space preference* *Ann. Assoc. Am. Geogr.* 59, 391. For the comments that follow see D. L. Huff (1963) *A probabilistic analysis of shopping centre trade areas* *Land Econ.* 39, 81

reached an impasse most central place studies were regarded simply as descriptive and not as explanatory. The discrepancy between action as predicted by central place theory and behaviour in the real world situation provided the basis for the resolution of this impasse. The work of geographers such as Murdie and Rushton (see pp 125ff) backed by a major change in human geography itself towards a behavioural approach,³⁴ has generated a considerable range of studies in consumer behaviour. This has meant a fundamental change in the scale of analysis from the city in the region to the individual in his 'environment' the new approach is usually called 'cognitive behavioural'. 'The cognitive behavioural approach to location theory and consumer behaviour is a synthetic framework, starting with the individual decision maker as the basic unit of analysis. The individual's behaviour is viewed as a function of the environmental situation and the decision making processes with respect to the environment. In contrast to the deterministic location theory framework which makes a set of assumptions that factors out the processes of human decision making, the cognitive behavioural approach specifically focuses upon the nature of the decision making process and the parameters which determine its outcome'.³⁵ The long quotation from R. M. Downs can be used to isolate four aspects of this approach which although separated are closely interlinked and overlap.³⁶ These are

- (i) *Motivation, goals and attitudes* The whole question of what motivates the shopper is paramount for this determines consequent attitudes and goals. If the individual seeks to minimize costs then time will be spent 'shopping around' to find the cheapest source of goods. On the other hand a wealthy, or lazy, shopper might be content with the nearest source. Yet another person might look on shopping as a basis for socializing and choose the friendliest shop. In more general terms it is possible to adopt Wolpert's conclusion that the concept of the spatial satisficer appears more descriptively accurate of the behavioural patterns of the sample population than the normative concept of economic man. The individual is adaptively or intendedly rational rather than omnisciently rational.³⁷

³⁴ H. Cox and R. G. Colledge (1969) *Problems of behavioural geography* North Western Univ., Dept. of Geogr. Res. Series 17 (Evanston, Illinois). For a much earlier statement at the beginning of this development see W. Kirk (1952) *Historical geography and the concept of the behavioural environment* Indian Geographical Society Silver Jubilee Souvenir and A. Subrahmanyam Memorial Volume.

³⁵ R. M. Downs (1970) *The cognitive structure of an urban shopping centre* *Environment and Behaviour* 2(1) 13-39.

³⁶ I would like to thank Dr N. J. Williams for help in preparing this material.

³⁷ J. Wolpert (1964) *The decision process in a spatial context* *Ann Assoc. Am. Geogr.* 54, 558. For an extension see pp 349-50.

which has to remain at an aggregate level. Lakshamanan and Hansen's retail potential model³¹ is presented here in the form set out by the UK Department of the Environment.³² The problem is to estimate the durable sales potential of a shopping centre. This is taken to be a function of its own size, the size and prosperity of its population catchment and its spatial relation to competing shopping facilities. In this context the size modified by income levels to give deployable expenditure can be equated with the threshold principle while competition from other centres represents the idea of range. The basic formulation is that of the gravity model with the region divided into a number of arbitrary zones as opposed to spheres of influence

$$SAL_j = \sum_i RSP_i \frac{\frac{ATR_j^b}{T_{ij}^a}}{\sum_k \frac{ATR_k^b}{T_{ik}^a}}$$

where SAL_j represents durable sales at centre j , RSP_i the retail spending power in zone i , ATR_j , ATR_k the attraction indices for centres j and k , T_{ij} , T_{ik} the interzonal travel time between zone i and centre j and zone i and centre k , and a , b are constants.

Before this can be run the various terms need to be defined, for example a measure of the attraction index has to be devised and travel times determined. The problems these cause will not be discussed since the concern here is with the nature of the concept rather than the technical problems of making it operational. Moreover, to a large extent the area of enquiry moves into that of regional planning rather than urban geography (although the boundaries between the two are more arbitrary than meaningful). Again, the introduction of this model is not a point of departure for embarking on the provision of a text in the building, calibration and operation of planning models, an obvious task in itself,³³ but rather to indicate one of the ways in which central place theory has played a part in generating models basic to contemporary regional planning.

b Consumer behaviour

If the planner has made considerable use of models derived from central place theory the geographer seemed at one stage to have

³¹ T. R. Lakshamanan and W. G. Hansen (1965) A retail market potential model *J. Amer. Inst. Planners* 31, 134-50.

³² Department of Environment (1973) *Using predictive models for structure plans* (London: HMSO).

³³ See for example G. Chadwick (1971) *A systems view of planning* (London) and I. Massey (1972) *Analytical models for urban and regional planning* (Newton Abbot).

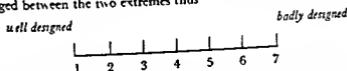
of concepts in what he termed 'semantic space'⁴⁰ In its application in this case it operates by asking respondents to assess the shopping centre in relation to a series of bipolar attributes. Nine cognitive categories were hypothesized with four attributes in each category giving a total of thirty six in the total scale. The nine categories were price structure and design, ease of internal movement and parking visual appearance, reputation, range of goods service shopping hours atmosphere. The breakdown of one of these categories into the four attributes can be given as an example

Structure and design

well designed
simple layout
designed with shopper
in mind
wide pavements

badly designed
complicated layout
not designed with shopper
in mind
narrow pavements

Each respondent was asked to assess the centre on a seven point scale ranged between the two extremes thus



Respondents placed a mark at what they thought to be the appropriate point. A mark between 2 and 3 would indicate that the centre was adjudged to be only fairly well designed. Each response was given a value and accordingly means and standard deviations for each attribute were calculated. In addition the total responses for each scale were correlated with the total responses for all other scales and a 36×36 matrix compiled. Downs then factor-analysed the matrix to give the principal factors contained—that is, how the image of the shopping centre was structured. Reviewing these findings Downs concluded that the image of a downtown shopping centre is composed of eight cognitive categories which, arranged in order of descending importance, are

- 1 Service quality
- 2 Price
- 3 Structure and design
- 4 Shopping hours
- 5 Internal pedestrian movement
- 6 Shop range and quality

⁴⁰ C. Osgood, G. Suci and P. Tannenbaum (1957) *The measurement of meaning* (Urbana, Illinois)

(ii) *Decision making and preference studies* The motives and attitudes of the consumer have to be translated into action and this is done via a decision making process in which various desiderata are played off against each other. In short each shopper will have a preference structure derived from basic attitudes and this can be represented by a series of cognitive categories such as cost (cheap-dear), distance (near far), variety (good range of goods poor range of goods), and so on.

(iii) *Perception* Between the preference structure of an individual and the actual choice in the real world will intervene the individual's perception of the various shopping centres. This will depend not simply on abstract preferences but on a whole range of other influences including past experience.

(iv) *Search procedures and learning processes* No individual will have perfect knowledge of an area on which to base decisions. There will be rather a continuing process of learning and of comparing centres. During this phase successive searches will probably be made to find those shops or centres most in accord with preferences.²⁸ Here the problem is that such a process will culminate in habit which might become out of phase with changing reality, and, until it is complete or rigidified into habit the actual behaviour of the individual may not be a confirmation of the preferences held.

Given the four aspects of a cognitive behavioural approach it will be increasingly apparent that the critical issue becomes the techniques of measurement which have to be devised in order to evaluate behaviour. An example from Downs will serve as an illustration of this sort of work.²⁹ A real difficulty is that as deeper comprehension of complex behaviour is sought so investigation merges into the work of the psychologist concerned with human motivation and choice. The basic problem presented by Downs was to assess the image of a shopping centre held by a group of shoppers, the hypothesis to be tested in more general terms relating to the way a segment of the spatial environment was evaluated. In order to achieve this Downs made use of the semantic differential devised by C. Osgood to measure the connotative meanings

²⁸ R. G. Gollidge and L. A. Brown (1967) Search, learning and the market decision process. *Geographical Annals Series B* 49, 117-24.

²⁹ R. M. Downs (1970).

This discussion has been directed towards indicating the nature of work in the field of consumer behaviour and the nature of the techniques which have been employed. The geographer faces very severe problems in this area for as the scale is enlarged to become that of the individual consumer so the study becomes more psychological than spatial.⁴⁴ Nevertheless the implications of the cognitive behavioural approach to traditional geographical problems are far reaching. There is no doubt that as a general framework it will aid us immensely in the search for lawfulness and regularity underlying shopping patterns

and it will be of fundamental importance in constructing theories about spatial behaviour. It will, however, take a very long time to reach this level of sophistication.⁴⁵ It is the aggregate of a multiplicity of individual decisions which underpins the patterns of central places as is so often the case, the geographer's basic dilemma is one of the scale at which he wishes to work, his difficulty is to reconcile work at a variety of scales on the same problem.

If central place studies are beginning to consider consumer behaviour there is as yet little attention devoted to the behaviour of the entrepreneur. Lewis⁴⁶ has attempted demonstrate how entrepreneurial interpretation of opportunities available can be seen in the context of part time operation of functions. Certainly if the geographer is going to involve himself in studies of the way the whole central place system is perceived by the individual consumer, he must also develop studies on the lines of those concerned with the policy of firms in industrial location, which take account of the decisions by entrepreneurs to develop types of establishments in particular towns.

3 PROBLEMS OF HISTORICAL CHANGE AND THE CENTRAL PLACE SYSTEM

Reference back to chapter 3 will provide yet another series of problems that are associated with central place theory. The model Christaller presented is a deterministic economic model and allows for very little historical variance to be introduced. The material considered in this chapter might well lead to one of the dangers noted

⁴⁴ For an indication of work by psychologists see H. M. Proshansky, W. H. Ittelson and L. G. Pivian editors (1970) *Environmental psychology: man and his physical setting* (New York) and for an example of the architect's interest see J. Lang, C. Burnette, W. Moleski and D. Vachon editors (1974) *Designing for human behavior: architecture and the behavioral sciences* (Stroudsburg, Pennsylvania).

⁴⁵ B. J. Garner (1970) 'Towards a better understanding of shopping patterns in R. H. Osborne, F. A. Barnes and J. C. Doornkamp editors of *Geographical essays in honour of K. C. Edwards* (Nottingham).

⁴⁶ C. R. Lewis (1970). See also T. L. Bell, S. R. Laeber and G. Rushton (1974) 'Clustering of services in central places', *Ann Assoc Am Geog* 64: 214-25.

- 7 Visual appearance
- 8 Traffic conditions

He then divided these into those related to the retail establishments themselves (1, 2, 4 and 6), and those related to the structure and function of the shopping centre (3, 5, 7 and 8). There is here a most significant movement from the simplistic assumptions of central place theory to the derivation of the bases on which people behave. Even so there is a considerable way to go beyond this. The image needs to be collapsed in terms of social groups, age groups, type of residence and all the various characteristics of the population. Nader concludes a paper on socio-economic status and consumer behaviour, by demonstrating differences in expenditure pattern related to type of house and the ownership of a car.⁴¹ In order to avoid one of the major problems of the semantic differential—the arbitrary selection of categories by the investigator—it is possible to employ personal construct theory.⁴² Very briefly, in this sort of operation the respondent is given three towns or shopping centres and asked to nominate the two most similar. The criterion of differentiation is then ascertained and built into the semantic differential so that the categories are constructed from the experience of people rather than imposed by the preconceptions of the investigator.

The introduction of personal construct theory implies that Downs's problem was relatively simple in that he was concerned with the evaluation of attitudes to one centre only, whereas in most investigations the task is to unravel the attitudes which led to the decision to select one out of a number of possible centres. To achieve this geographers have resorted to attitude tests which were initially derived for work in social and educational psychology. The scaling of attitudes is usually accomplished by means of Likert or Thurstone scales based on the expression of agreement or disagreement to prepared statements. But this is a complex technical area and reference to appropriate literature is the only course here.⁴³

⁴¹ G. A. Nader (1969) Socio-economic status and consumer behaviour *Urban Studies* 6, 235-45.

⁴² G. A. Kelly (1955) *The theory of personal constructs* (London) also D. Bannister (1962) Personal construct theory: a summary and experimental paradigm *Acta Psychologica* 20, 104-120 and J. Harrison and P. Saare (1971) Personal construct theory in the measurement of environmental images *Environment and Behaviour* 3, 301-74.

⁴³ The two key works are R. Likert (1932), A technique for the measurement of attitudes *Archives of Psychology* 140. L. Thurstone and E. Chave (1929) *The measurement of attitude* (Chicago). For a text in behavioural research see F. N. Kerlinger (1969) *Foundations of behavioural research* (London).

to special functions with peculiar locational demands, the other a set of towns owing their growth to central place functions derived from general regional demand. These are intimately related for their complex interaction produces an urban net (S_1). This net is then itself subject to the continuing modification brought about by two sets of

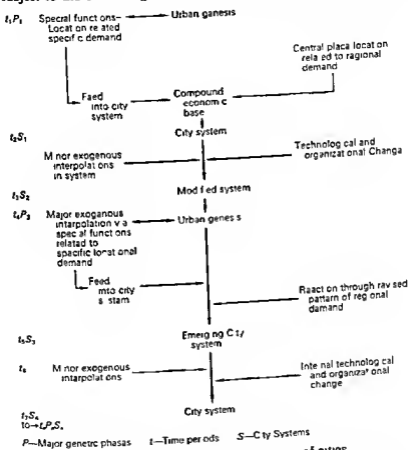


Figure 7-5: The growth of a system of cities

influences. The first of these is the economic, technological and organizational changes which progressively bring new pressures to bear. Thus changes in transport techniques or the productivity of agriculture will influence the system. The second set of influences are closely related and could be included under the same general heading

at the outset, for towns are not places solely for the satisfaction of economic demands. There is a wide variety of other demands, administrative, social, cultural, all of which have an influence on location and size. Many of these are derived from the past, a feature self evident in such centres as Florence or Canterbury but also applicable on a minor scale. Even without these marked examples the evolutionary element has to be built in and a chance or random process substituted for the simple determinism of Christaller. To some extent this has been envisaged by a change to the employment of a probability (stochastic) approach to the generation of settlement patterns,⁴⁷ though the 'explanatory' element in these studies remains slight.

The situation, whereby classical central place concepts are increasingly revealed as inadequate, which has been sketched in this chapter may now be summarized as follows

- 1 Hexagonal lattices have nowhere been convincingly demonstrated and even regularities have only been tentatively demonstrated
- 2 A hierarchical structuring holds good only over limited and homogeneous areas, the aggregation of areas masks this structuring
- 3 Studies of the perception and use of centres by individuals have not demonstrated that their behaviour is in accord with that predicted by theory
- 4 The economic deterministic character of central place theory, just as it takes no account of individual perception, allows no room for the random disturbances brought into play in the historical past and which are still relevant to modern conditions
- 5 The restriction of central place analysis solely to economic tertiary services represents an abstraction from the reality of city locations where a wide variety of other activities are performed and exert a marked influence

A situation has now been reached where it is possible to suggest the main controls of urban location as they have been set out in the last six chapters, and to return to the context of the evolving city system which was left at the end of chapter 3.

The accompanying diagram (figure 7-5) attempts to portray a conceptual framework which summarizes the various influences on the locational pattern. The urban system (S) is conceived as being created at time t_1 through a phase of genesis (P_1). The system itself becomes rapidly composed of two elements, one a set of towns owing their origin

⁴⁷ R. Morrill (1962) *Simulation of central place patterns over time*, in K. Norberg, editor (1962) *IGU symp urban geogr Lund 1960*, 109. R. Morrill (1965) *Migration and the spread and growth of urban settlement* (Lund). G. Osborn (1967) *Central place systems, spatial interaction and stochastic processes* *Reg Soc Amer Pop* 18, 13.

Lampard quotes Maruyama⁵¹ as concluding that every system, including city systems, is made up of sub-systems variously manifesting deviation correcting or amplifying processes whose prevalent effect will either tend to return the whole to morphostasis or transform it by morphogenesis. To some extent the genetic phase, the major exogenous interpolations, envisaged in figure 7-5 represent transformations by morphogenesis, the emerging city systems within phases of transition represent morphostasis. Generalizations which argue for increasing entropy in a city system—that is the movement of the system to a more uniform and less random form—are only acceptable for certain selected phases or periods, no universal process can be isolated.

The conclusions set out above are, to a degree, confirmed by Robson in his book *Urban growth*. After examining the growth of British towns during the nineteenth century, Robson concludes 'the details of the spatial patterns can only be interpreted in terms of the particular factor endowments and historical events which underlaid the growth of certain towns and the decay of others'.⁵² These endowments and events epitomize the consequences of major exogeneous interpolation into the system of cities. The remainder of Robson's book seeks to demonstrate that 'the diffusion of entrepreneurial innovations through a set of nineteenth century cities may well be characterized by a simultaneous process of hierarchical space jumping from larger to smaller cities and of localized spread outwards from regional centres'.⁵³ In essence this is a version of the cumulative character already considered as part of the way in which the city system grows. Robson's study adds both depth and elegance to previous work but provides no novel basis for synthesizing urban growth.

To a large extent many of the problems which have been considered are derived from the scale at which the problem of town size and location is viewed. The individual decision as to where to shop for an article, the large scale changes brought by industrialization, are both relevant. The problems for investigation are great but at least they can be seen to have an interrelation within the notion of an urban system.

Notes on further reading

The main references on consumer behaviour are included in the footnotes but the following are most useful.

- DAVIES R. L. (1973) Patterns and profiles of consumer behaviour. *University of Newcastle on Tyne, Dept Geogr. Res. Series 10*
- ⁵¹ M. Maruyama (1963) The second cybernetics: deviation amplifying mutual causal processes. *Gen. Sys.* 8, 233-41
- ⁵² B. T. Robson (1973) *Urban growth: an approach* (London), 126
- ⁵³ B. T. Robson (1973), 186

These are the series of minor exogenous influences which, except in very unusual cases, continually affect the system. The system therefore, is never a closed system but remains open (S_2). The minor or long term slow changes can be absorbed into the system without signs of discontinuity but in most areas there occur major changes and hence major exogenous interpolations which are clearly related to specific new urban roles with specific and new locational demands. This can involve the creation of an unconformable urban net (P_2). There follows a period of rapid adjustment with marked fluctuations in the rank position of towns in the system until, through the revised pattern of regional demand, a modified system (S_3) is produced. Once more this is subject to minor interpolations and will react to technological and organizational change. The present city system, therefore, is seen as a momentary still in a moving picture in the true context of 'sequent occupance'. It is the product of the interaction of a series of time and place related acts of growing and declining towns.

There are other theoretical formulations which can be linked with the scheme outlined, and which have been partially introduced at an earlier stage in chapter 3. The whole process of town founding can be conceived as an innovation and the subsequent development as a diffusion process. Hagerstrand's three stages in the process⁴⁸ are very similar to the stages of 'town genesis', 'transition and sorting', and 'climax' that were outlined in chapter 3 for the Welsh system and indicated in more generalized form on figure 7.5. Each major phase has many analogies with the way in which the available space and economic potential are eventually taken into the urban service network and the way in which this network increases in density. Again the patterns of urban industrial growth in a cumulative fashion set out by Pred,⁴⁹ and considered earlier, can be associated with the way in which the initial creations of a genetic phase can effectively remain the major foci by the positive influence of self-sustaining growth rather than by the sole operation of external circulation. Lampard⁵⁰ in considering urban systems introduces the two notions of morphostasis and morphogenesis. Morphostasis represents the result of 'deviation-counteracting feedback networks' or 'a most probable state under constraint'. Morphogenesis is a deviation amplifying process, giving an open ended development with no evident tendency to entropy.

⁴⁸ T. Hagerstrand (1952) *The propagation of innovation waves* *Lund Stud. Geogr. Ser. B Human Geography* 4, 16-17.

⁴⁹ See chapter 4, page 68.

⁵⁰ E. Lampard (1968) *The evolving system of cities in the United States*, in H. S. Perloff and L. Wingo, Jr., editors (1968) *Issues in urban economics*, 98-100 (Baltimore).

8 THE ANALYSIS OF TOWN PLAN

The distribution pattern of towns and the complex flow of goods and people within that pattern have been represented in the preceding chapters as constituting a grand unity or, if the term is preferred, a system. But for purposes of examination that unity has been broken and the whole divided into a number of aspects which could be separately considered. In examining the *internal* characteristics of towns, as against their external relations, the same general structuring can be proposed, for at the most complete and complex end of the scale there is the 'townscape'. This term 'townscape' is given different emphasis dependent on the particular discipline in the context of which it occurs, but in urban geography it is taken to mean the whole objective visible scene in the urban area, or the total subjective image of the city¹.

This totality can again be envisaged as a system made up of a complex of interrelated parts. It also follows that there are comparatively few studies of 'townscape' because of the very intricacy of the problem, although a wide new field of enquiry is being opened by studies of perception which, instead of accepting an all-embracing objective interpretation of the townscape, are concerned to evaluate what elements are perceived by the individual and in what way this perception is related to behaviour and hence to activity systems within the city.² But if this aspect of perception, whereby the individual reduces the city to the level of his own needs and operations, is left aside until later (chapter 13) the more formal interpretation is left. It has now become a convention to break down the complexity of townscape into three component parts: street plan or layout, architectural style or build, and function or land use. These are closely interrelated and indeed their separation in academic studies has led to gross distortions of reality. Most economic theories of land use ignore the fact that a town is made up of three-dimensional structures and assume the spread of uses over an even, undifferentiated surface. But for analytical purposes, and with the same principle in view as was evident in the analysis of

¹ K. Lynch (1960) *The image of the city* (Cambridge, Mass.)

² F. Stuart Chapin (1965) *Urban land use planning* second edition, 221 et seq (Urbana, Ill.)

DOWNS, R M (1970) The cognitive structure of an urban shopping centre (see footnote 35)

More general works are

COX, K and COLLEDGE, R G (1969) *Problems of behavioral geography* (see footnote 34)

DOWNS, R M (1970) Geographic space perception past approaches and future prospects, in *Progr in Geogr* 2 (London).

RFES, J and NEWRY, P, editors (1974) Behavioural perspectives in geography *Middlesex Polytechnic, Monographs in Geography* (London) 1.

The study of Welsh towns by the author attempts to outline the growth of a system of cities

CARTER, H (1969) *The growth of the Welsh city system* (Cardiff)

Morrill's study of part of Sweden should also be read

MORRILL, R L (1966) Migration and the spread and growth of urban settlement *Lund Stud Geogr Series B Hum Geogr* 26

Robson's study is now the best complete work on city growth

ROBSON, D T (1973) *Urban growth an approach* (see footnote 52)

Other relevant studies are

LAMPARD, E (1964), The evolving system of cities in the United States (see footnote 50)

HADDEN, C H (1956) Some spatial aspects of urban growth in the United States *Econ Devel and Cult Change* 4, 386

THOMPSON, W R (1965) *A preface to urban economics* (Baltimore), chapter 1, Economic growth and development processes, stages and determinants

The most useful study utilizing the notion of entropy in settlement systems is

SEMPLE, R K and COLLEDGE, R G (1970) An analysis of entropy changes in a settlement pattern over time *Econ Geogr* 46, 157

are no dominant through routes or points. There would be few true examples although Dickinson points to the Moorish towns of Spain and some older sections of North African towns.

2. *Radical concentric plans* The term has been defined above. In so far as progressive outward growth from a nucleus such as church or market place is envisaged Dickinson is inclined to look upon these plans as the result of natural growth rather than as necessarily planned forms.

3. *Rectangular or grid plans* Again these have already been defined. A progressive modification of the true grid to the generally rectangular can be included under this omnibus description.

This outline is a useful though not very penetrating descriptive or classifying device in approaching the study of plan. Most towns fall into none of these categories neatly and accordingly further elaboration has been attempted. The sterility of this approach can be illustrated by considering a scheme proposed by Tricart⁵ which is given in table 8-1 in outline and should be read with the appended notes (p. 146).

The other traditional approach to the study of town plan has been through the identification of major growth phases. Towns it is argued seldom grow slowly and gradually but are characterized by periods of stillstand and periods of rapid growth. The periods of extension provide the successive plan elements and it is possible to isolate them and then to interpret them by reference to the general history of town development. In chapter 3 where the urban growth process was examined it was noted that a distinctive aspect of this process was physical extension and it was also noted that there were a large number of studies devoted to this aspect of urbanization. These are the standard works such as *Town building in history*⁶, which isolate and examine each dominant phase in the history of town design. Examples of these books range from Lavedan's classic *Histoire de l'urbanisme*⁷ to the recent fine work by Reps *The making of urban America*⁸. There is little point here in attempting to present a review of phases of town development in this tradition for any selected area. The standard works are easily accessible and an attenuated outline of no value. In the geographical context of plan analysis for most of the above works are historical in concept the main purpose of such an approach is to establish the generality of urban extension in an area. The way in which any town has grown and the successive phases identified can then be interpreted in relation to the

⁵ J. Tricart (1954) *L'habitat urbain Cours de géographie humaine* Fasc. 2 (Paris)

⁶ F. R. Horns (1956) *Town building in history* (London)

⁷ P. Lavedan (1926-52) *Histoire de l'urbanisme* 4 volumes (Paris)

⁸ J. W. Reps (1965) *The making of urban America* (Princeton)

urban functions, of advancing comprehension by the simplification of reality, it is preferable to adopt this standard breakdown in the first place and consider each of the three components of townscape separately.

The first of the three is town plan, the analysis of which has the anomaly of being one of the oldest and most widely known aspects of urban geography and, at the same time, the one in which comparatively little progress has been made. At the Lund Symposium on Urban Geography in 1960, Garrison maintained that in urban morphology 'the studies we are now making are no richer than the studies we were making twenty or thirty years ago',¹ and blamed this on the lack of development of general theory and the failure to use good measuring devices. The intervening decade has seen very little change in this situation. Students of town plan have had no Christaller to follow and consequently have tended to work within traditional lines. These traditions have been made up of two sorts of analysis, the one mainly concerned with shape, the other with the historical components of the plan.

The analysis of the shape or form of the town plan has long generated a terminology which has become part of everyday vocabulary. The most common of all these terms is the 'grid plan' or 'chequer board'. Strictly speaking this means a layout in which every street crosses another at right angles and at the same interval. Looser use of the term has, however, reduced it to mean any sort of rectangular arrangement of streets. In contrast with the true grid is the completely irregular layout, while the radial concentric plans form a third group. Radial-concentric is a self-defining term where properly a number of roads radiate from a centre and are successively cut by a series of concentric circular roads, the centre of the radials and the circles being common. But again this term has been debased and is used generally for any street layout which has a strong circular, or indeed nuclear element. Debasement was to a large extent inevitable for few cities show a street plan which meets the precise demands of the true grid or radial-concentric schemes and the terms have therefore become little more than a conventional descriptive shorthand. Nevertheless, attempts have been made to erect rich classificatory structures on these rather inadequate foundations. Dickinson has proposed what he terms 'basic systems of urban ground plan'.² These are defined as follows

- 1 *Irregular plans* When the conditions are strictly interpreted the streets in this group are haphazard in width and direction and there

¹ K. Norberg, Editor (1962) *Symposium discussion IGU sym on urban geogr Lund 1962*, 463

² R. E. Dickinson (1950) *The west European city* (London)

general pattern. The key to this sort of approach is the conventional growth plan which has played such a major role in urban geographical studies. Figure 8-1 shows the growth to 1900, of the small town of



Figure 8-1 Growth plan of Aberystwyth. After H. Carter in E. G. Bowen (1957)

This is a standard growth plan in which medieval nucleus, early nineteenth-century rectangular extra-mural extension, and late nineteenth and early twentieth-century ribbon development are apparent.

Aberystwyth on the west coast of Wales. The dates selected are such as to isolate the three major periods when rapid extension took place so that the block structure of the medieval town, the grid of the early nineteenth-century extensions beyond the walls and onto the common lands of the borough, and the linear extensions of the latter part of

table 8-1: Tricart's (1954) scheme for the analysis of town plan

- 1 *Homogeneous towns* i.e. towns with a unified structure¹
 - a *Planned towns*²
 - (1) Rectangular plans
 - i Linear
 - ii Ribbed
 - iii Parallel
 - iv Grid
 - (2) Radial concentric plans
 - i Star³
 - ii Circular⁴
 - b *Unplanned towns* i.e. towns of natural growth⁵
 - (1) Fortress towns⁶
 - (2) Star shaped towns⁷
 - (3) Irregular plans⁸
- 2 *Heterogeneous towns* i.e. towns with a complex structure⁹
 - a *Replanned towns*¹⁰
 - b *Polynuclear towns*¹¹
 - c *Net pattern towns*¹²
 - d *Globular towns*¹³
 - (1) Concentric
 - (2) Radial

- 1 The essential feature is that the town is made up of a simple plan unit, a situation which is unlikely in any area of strong urban growth
- 2 Allowance has to be made for alteration of the planned core by later growth under changed conditions
- 3 The radials dominate
- 4 The concentric roads dominate
- 5 These display less systematic forms but possess a homogeneity often dependent on continued adaptation to a dominant feature either physically derived such as an aspect of site or culturally derived from the past
- 6 This is an odd class since it is designated by function rather than by shape. The implication is that form is dominated by a strong focal point
- 7 Created by free outward growth, particularly where there have been no walls
- 8 Irregularity of plan is often a consequence of site conditions but the same conditions mean that the town develops as one unit
- 9 In this major category the towns are made up of more than one plan element giving a richer and more varied class but one which Tricart argues is not as numerically dominant as might be expected. A transitional class is suggested where a town is made up of a series of clear geometrical elements but which have no relation to each other. Los Angeles is the example proposed
- 10 A new planned section is often added to an older irregular core
- 11 Made up of juxtaposed but contrasted elements such as ex-colonial towns with their European compounds contrasted with the native quarters
- 12 This is near to the original meaning of conurbation, being made up of a series of separate nodes connected by transport lines. A mining area is suggested but presumably the classic dispersed city would be of this form
- 13 The diverse elements here show one of the emphases noted in 3 and 4 above

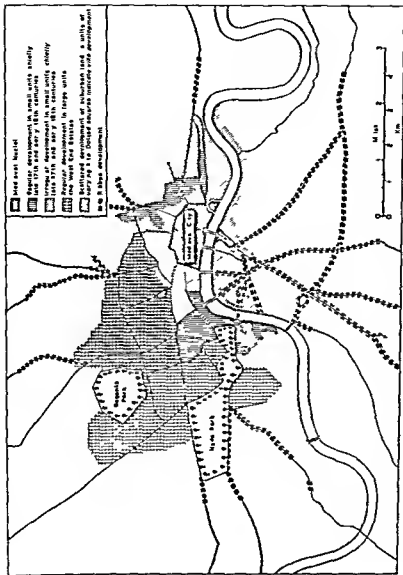


Figure 8-2: The growth of London up to 1830 After J N Summerson (1945)

A growth plan on a very different scale from that in Figure 8-1. Here the major elements in London's growth are clearly depicted. The medieval core is surrounded by irregular close development, which by the nineteenth century was mainly manufacturing in function and working class in character. The regular development of the western areas about the medieval nucleus foreshadows the regular development of estates. Some detail has been omitted from the original.

the century, are clearly established. Three growth phases are thus linked with three types of layout. In turn each layout can be interpreted as a characteristic product of its age. Thus the early nineteenth century development is in many ways a characteristic extension which has found its apotheosis in the westward extension of London. Figure 8-2 shows the way in which London had grown rapidly in the late seventeenth and particularly in the late eighteenth century and the early nineteenth by the development of a whole series of squares and terraces on what had once been the aristocratic estates. Sir John Summerson's *Georgian London* provides a study of this process, constituting a detailed investigation, therefore, of one of these growth phases.¹⁰

It is apparent that this process of plan analysis is essentially historical and provides little of the theory or measurement which it is claimed are needed to put geographical studies on a more respectable plane, or at least to substitute generality for the scholarly study of the unique. Certainly some advance in this respect has been made by M. R. G. Conzen who has attempted to establish 'some basic concepts applicable to recurrent phenomena in urban morphology'.¹¹ There is, however, a considerable conceptual gap between the isolation of 'recurrent phenomena' and the 'provision of a theoretical basis yielding concepts of general application' and whereas Conzen undoubtedly provides a major step forward both in concept and meticulous analysis of plan, his work hardly provides a theoretical basis. Conzen's main contribution, the admirable detail of analysis excluded, would seem to lie in the way in which the interaction between phases of extension is introduced, whereas often in previous studies bits of plan have been merely tacked on successively. He demonstrates at the outset that the major townscape aspects—plan, build and land use—react at different rates to the forces of change brought to bear on them. Land-use is the most volatile and can respond rapidly. The buildings themselves can be adapted to alternative uses without replacement, and the capital invested in them means that this takes place so that change is less rapid than with land use. But the layout of a town, the streets themselves, cannot be destroyed and rebuilt as easily as single buildings, and hence remains relatively permanent. The result, Conzen argues, is that plan is the most conservative aspect of townscape and hence demands a historical approach. At the outset, therefore, his work is conventional insofar as it involves the identification of growth phases. It is only within this

¹⁰ J. N. Summerson (1946) *Georgian London* (London)

¹¹ M. R. G. Conzen (1960) *Alnwick: a study in town plan analysis* *Trans. Inst. Br. Geogr.* 27

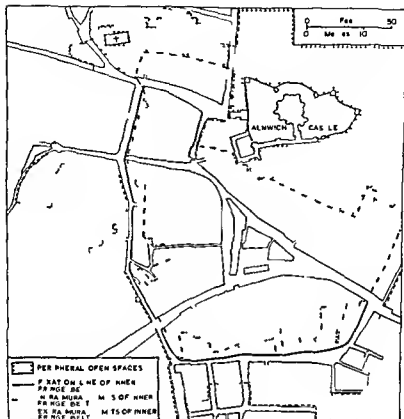


Figure 8.3 The fringe belts of Alnwick in 1851 After M. R. G. Conzen (1960)

This is a summary map which omits much of the detail of the original. The fixation line marks the former town walls; the inner fringe belt represents development upon the tails of the former burgage plots; the extramural belt represents more spacious development on the land outside the walls. These are the structural elements in the evolving plan.

approach that some fundamental concepts are introduced which it is claimed have significance beyond the simple case under consideration

Good examples of these concepts are the ideas of 'the fixation line' and 'the fringe belt'. Conzen criticizes many of the traditional growth plans, stating that the phases mapped are haphazardly chosen and are seldom related to real structural features in the plan itself. But such structural features can be identified, for the plan is not made up by a simple process of addition. Thus in the growth process certain limits are established which by their significance act as fixation lines. These lines structure the plan which grows in annular fashion in relation to them in a series of fringe belts, so that the whole plan can be conceived as being given form by the interaction of successive fixation lines and fringe belts. In the case Conzen analyses, the small town of Alnwick in Northumberland, the medieval wall is considered as constituting a fixation line. In relation to it two processes develop, repletion within the wall and accretion outside it. Accretion takes place within the fringe belt through the development of the open fields which lay out side the fixation line. The fringe belt itself is composed of two sections, the proximal or inner margin where development is closer and more continuous and the distal or outer margin where growth is more sporadic and the development more dispersed in character. Ultimately the fringe belt plots can be *preserved*, that is they remain as open ground within the urban area, or they can be *translated*, that is used for special purposes. Thus one can conceive of many urban parks and gardens as 'preserved fringe belt plots'. The general outline of the situation is illustrated in figure 8-3.

The above summary is but an outline of one of the concepts introduced into his analysis by Conzen. The approach he adopts clearly goes beyond the descriptive account of growth phases and digs down into the structure of town plan. Indeed the very notion that plan has such a structuring is a notable advance on the idea that it merely consists of adding successive pieces together. But valuable as this is, the claim that a theory is being developed is not justified. The approach is not theoretical-deductive but essentially empirical inductive and it is on the empirical approach that emphasis is ultimately placed. When Conzen identifies 134 plan elements in a small town (population 7,500) then it is evident that immense local complexity has overtaken generality. As a work of intense scholarship and one which adds notably to the conventional growth plan study, Conzen's book is distinctive.

A series of papers by Whitehand has developed some of the implica-

a line pattern and it would seem that any statistical descriptive device would enable a more relevant and measured comparison to be made of street patterns. A study which might well be appropriate is that of Dacey on line patterns,¹³ but the ultimate grouping of such patterns into random, grouped and non random, in the same way as point patterns are analysed by nearest-neighbour methods, seems far too restricted as far as town plan analysis is concerned.

A further area of investigation could well be associated with the dimensional analysis of linear networks. A town plan is a linear network and it would seem that all the techniques which are appropriate to this sort of problem could equally be applied to town plans. If rail networks in countries can be analysed then there seems no reason why street patterns in towns cannot, although a major problem does occur in the definition and identification of the networks.¹⁴ The total length of the street system (L) related to area (A) might provide a beginning where L/A gives a measure of street density, and the variance of street density over the urban area would be an interesting aspect of plan.¹⁵ The shape of the network, an aspect of graph theory as proposed by Karsky, is less easy to derive since this involves the concept of diameter, or the shortest distance between the most distant vertices of the plan.¹⁶ If the total city plan is broken into convenient smaller units in order to identify internal variation, then 'diameter' can have no real meaning. It is unfortunate in this respect that the rich resources of graph theory cannot easily be brought to bear. Perhaps the simplest measure would be merely to find the mean angle at which streets intersect in each small unit and this, together with the street density and a measure of linear grouping into random, non random and grouped patterns, might be utilized to associate similar plan areas. The result would be a breakdown of the total city layout into 'plan regions' based on objective and measurable criteria. The interpretation of this regional pattern would then be the basic purpose of plan analysis.

This introduction of 'purpose' immediately raises the need to consider plan contrasts from some more relevant standpoint than the traditional historical view. The foundation already exists if Stanislawski's study of the grid pattern town is examined.¹⁷ In a paper

¹³ M. F. Dacey (1967) Description of line patterns, in W. L. Garrison and D. F. Marble, editors (1967) *Quantitative geography* Part I, 277 (Evanston Ill.)

¹⁴ P. Haggett (1965) *Locational analysis in human geography* 236 (London), P. Haggett and R. J. Chorley (1969) *Network analysis in geography* (London)

¹⁵ P. Haggett and R. J. Chorley (1969)

¹⁶ R. J. Karsky (1963) Structure of transport networks: relationships between network geometry and regional characteristics. *Inter. Congr. Dept. Congr., Res. Pap.* 84

¹⁷ D. Stanislawski (1946) The origin and spread of the grid pattern town. *Geogr. Rev.* 36, 105

tions of Conzen's work.¹¹ In particular he has effectively demonstrated the operation of a process of competition for fringe belt sites between the institutions that are particularly characteristic of these areas—for example, the parks and gardens noted above—and residential uses, which can compete effectively in times of economic and housing boom. Whitehand writes, 'Institutions originally located at some distance from the edge of the built up area, on what were submarginal sites for the house builder, may be surrounded by new residential development by the end of a housing boom. Thus we must envisage a situation in which, by the end of a boom period, a zone of housing will have been added to the built up area but, scattered beyond it and sometimes lying within it, will be the sites of institutions. During a housing slump, while the house builder is largely inactive, institutions will develop the majority of the most accessible sites which, added to what were outlying institutional sites created during the previous housing boom period, will form a zone with a strongly institutional character. Repeated cycles of booms and slumps are likely to result in a series of alternating zones characterized by different proportions of institutions and housing.' This research is most significant because the investigation of morphology via the fringe belt is integrated with that of land use patterns and is therefore relevant not only to the chapters which follow on urban land use and the rural urban fringe, but especially to that most important area of the integration of morphological and functional studies.

There are two aspects of mathematical geography which would seem to have some relevance to the problem of town plan. The first of these is the analysis of shape as proposed by Bunge.¹² Since descriptions of plan are often couched in the terminology of shape—star shaped or globular for example—then it would seem that the overall shape of towns could be analysed in this fashion. At the moment, however, the theoretical basis is hardly established firmly and the complexity introduced—for the overall shape also possesses an internal structure (streets and blocks)—would seem to indicate that although there may be a future line of development, it is as yet too tentative to be explored here.

The second aspect is the development of theoretical work on the description of line patterns. The network of city streets is *par excellence*,

¹¹ J. W. R. Whitehand (1967) Fringe belts: a neglected aspect of urban geography *Trans Inst Brit Geogr* 41, 223-33. (1972) Building cycles and the spatial pattern of urban growth *Trans Inst Brit Geogr* 56, 39-55. (1974) The changing nature of the urban fringe: a time perspective chapter 3 in J. H. Johnson editor *Suburban growth* (London).

¹² W. Bunge (1962) *Theoretical geography* 73-87 (Lund).

seen in that phase of town building which is usually given the name Renaissance and Baroque. Mumford, outlining the controlling conditions of the new urban complex, writes, 'between the fifteenth and eighteenth centuries a new complex of cultural traits took shape in Europe. The new pattern of existence sprang out of a new economy, that of mercantile capitalism, a new political framework, mainly that of a centralized despotism or oligarchy, usually embodied in a national state, and a new ideological form, that derived from mechanistic physics'.¹⁸ Here Mumford associates three of the variables that have been isolated—economic, political and cultural—and from them derives urban form. *The city in history* is perhaps the outstanding study which sees plans as the product of such associated forces, although their analysis is confined to the usual historical progression. But in a section, headed appropriately 'The ideology of power',¹⁹ Mumford derives the obvious parallel with a much earlier period, 'thus the baroque rulers reinstated all the institutions of the original urban implosion'.²⁰ But the comparison is not completely true for although the processional way at Ur might have been a response to the same basic forces as the avenues of Versailles, the residential areas were very differently disposed. The order and harmony of mechanistic physics had produced an emphasis on the complete balance and control of the whole plan, but such was certainly not the case at Ur where the detail of much of the city seems to have been the consequence of innumerable individual decisions. But it follows that the city plan is the reflection of the concentration of power and of the cultural forces at work. Versailles has already been noted, Richelieu (figure 8-4) provides a smaller but no less appropriate example and can indeed be regarded as the precursor of Versailles.²¹ Cardinal Richelieu decided in 1625 to transform an old residence and convert it into a chateau fitting to his estate. The architect was Jacques Lemercier. The chateau was finished by 1635, but in 1633 royal permission had been obtained 'faire bâtir un bourg clos, avec pouvoir d'y établir des marches et foires ayant pareils privilèges que celles de la ville de Niort et de Fontenay-le-Comte'. The whole layout displays that unity of design that comes from being built at one time and under the complete control of one hand. The aspects of design, which Lavedan in his *Histoire de l'urbanisme* carefully notes, are a consequence of that control. It is possible to discuss at length the aesthetic and planning principles of this case, but these

¹⁸ L. Mumford (1961) *The city in history* 345 (New York)

¹⁹ L. Mumford (1961), 363-7

²⁰ L. Mumford (1961), 367

²¹ For a description see P. Lavedan (1976-82) *Histoire de l'urbanisme. Renaissance et temps modernes* 228-32 (Paris)

which is primarily concerned with the evolution of the grid pattern, he derives certain general conditions which are necessary for such a plan to be adopted. That is, Stanislawski presents an argument that, independent of particular historical circumstances, a grid will emerge given certain conditions. There are five conditions proposed

- 1 A new town, or a new part of a town is in question
- 2 There should be centralized control
- 3 Very often the new town has colonial status
- 4 There should be a measured disposition of available land
- 5 There should be a knowledge of the grid

Inspection of these will reveal that, excepting the last they can be reduced to the single notion of the operation of centralized political control in a colonial or quasi-colonial situation. But it is possible to carry the argument further. The rigidity of the grid demands centralized political control. In more general terms uniformity of plan (though this may take a wide variety of forms other than the grid) reflects organized central control, so that contrasts in the uniformity of plans are a reflection of the degree of the concentration of power. This concentration can be interpreted via the decision making process thus when decision making is fragmented, plans are incoherent, when it is concentrated, plans are coherent. The merchants of medieval London built their houses where they wished and from this fragmentation an incoherent plan of streets and alleys resulted. The modern suburbs are laid out by a municipal authority and a coherent plan appears.

This particular line of argument may be contested, although it is more likely to be judged self evident. But it is a line independent of particular historical input defining a unique situation. It suggests that if plan characteristics could be measured by such methods as those proposed above, then these could be set against a series of other variables, one of which would be a measure of the degree of concentration of the decision making process. It is the essence of this argument that the variables which shape plan can be isolated independently of any one historical phase. It is possible to propose a list which would include, for example, political, economic, cultural and religious factors. These do not work independently, however, and most plan elements are a product of two or more, or indeed of all of them. In the present context they may be considered separately.

Under the heading political influences are included those forces which are related to the concentration of power either in the hands of a single person or a group of people. It has already been maintained that the conditioning forces of the grid plan as envisaged by Stanislawski nearly all pertain to the concentration of power. The same situation is

differing aspects appear. On the one hand the concentration of power led to the construction of company towns with very clearly marked rectangular patterns. But at the same time the freedom in many places from any controlling national or municipal authority led to the conditions of near anarchy under which planless agglomerations of poor cottages took place creating the feature so often associated with industrialization. Without prolonging the discussion, it is contended that studies of the way in which controlling power is distributed will give considerable insight into the degree of formality in town layout.

To a large extent in the above discussions a second variable has been introduced but not identified and this is the one which was initially called 'cultural'. This is the system of social values which underlies town layout. Perhaps an appropriate example is Philadelphia (figure 8-5). 'The dominant force in the shaping of Philadelphia' writes A. N. B. Garvan, 'was the philosophy of William Penn'.²³ This can be applied to the layout as well as the general atmosphere of the early city. The charter which Penn obtained from Charles II in 1681 established him as governor and proprietor. Purchasers of a share in the province were also to be provided with a city plot within Philadelphia. The commissioners who accompanied the first settlers were given detailed instructions dated 30 September, 1681, for the laying out of the new town, and the regularity of a somewhat unusual town was clearly provided for by Penn in the instructions. 'Be sure to settle the figure of the town so that the streets hereafter may be uniform down to the water from the country bounds, let the place for the storehouse be on the middle of the key, which will yet serve for market and statehouses too. This may be ordered when I come, only let the houses built be in a line, or upon a line, or as much as may be. Let every house be placed, if the person pleases, in the middle of its plot, as to the breadth way of it, that so there may be ground on each side for gardens or orchards, or fields, that it may be a green country town, which will never be burnt, and always be wholesome.'²⁴

Garvan points out that this implies a very unorthodox city since Penn 'neglected the urban centre for his gentlemen's seats. He visualized, not a city but a residential district of regularly arranged parks with uniform streets down to the water from the country bounds.'²⁵ The only commercial consideration is the 'place for store-houses'. The actual planning on the spot by Thomas Holme brought

²³ A. N. B. Garvan (1966) *Proprietary Philadelphia as an artefact* in O. Handlin and J. Burchard, editors (1966) *The historian and the city* 197 (Cambridge Mass.)

²⁴ J. N. Reps (1963) 160.

²⁵ A. N. B. Garvan (1966) 190.

details such as the way the main squares are disposed, are a consequence of the design ideas of the time

The same concentration of power although in a somewhat different general context, led to the ground plan of Washington, appropriately a centre of federal government and the focal point of the political

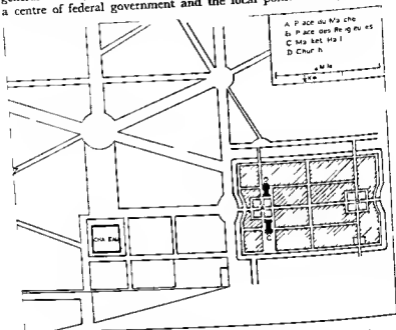


Figure 8.4 Richelieu This is a composite map which attempts to depict in diagrammatic form the layout of the town and the chateau and its grounds

power of the United States. At the same time it had clear links with its European predecessors through L'Enfant as designer—who 'was the product of his age and the instrument through which certain principles of civic design that had been developed in western Europe found expression on the Potomac river'.²² The whole situation, however, in which these principles could be put into effect depended upon the unity of political control vested in the commissioners as the instrument of the president of the United States.

If in contrast one considers towns during the industrial period, two

²² J. W. Reps (1965), 252

to bear some experience of town foundation in Ireland,²⁶ as well as much of the discussion of the reconstitution of London after the Great Fire, so that eventually 'little remained of Penn's original plan and instructions. Instead an extremely interesting and complex plan evolved which owed little to the proprietor except the partial achievement of his intent. But nevertheless Holme firmly agreed with Penn's objectives to create a regional plan suitable for Quaker worship in which the proprietor's interests would be secure.' Garvan develops the contrast between Philadelphia and the New England settlements with which it had two major differences. The settlement was widely scattered and settlers isolated and the whole of the three counties was covered more or less at once: there was no moving frontier. Only a population predominantly free of dependence, either upon a fixed ministry or a place of worship, could make so rapid an advance. Friends 'free to worship with one another in their own houses found the scheme totally agreeable, while their contemporaries disputed in New England legislatures the precise location of Puritan meeting houses and adjacent home lots'.²⁷

It is also instructive to observe the consequences for the plan once the concentration of decision making in Penn's hands was broken. The American Revolution destroyed the proprietary, which was transformed into a 'political administration for the benefit of democratic voters and settlers'. The result was the substitution of a varied, haphazard 'control', in which individual speculation was a key factor. 'It would be at this point quite easy to condemn the *laissez-faire* city and point out that as an artefact of the mature philosophy of William Penn, Philadelphia's end was near'.²⁸ The point here is neither to condemn nor praise nor even to evaluate plan in such terms at all but to demonstrate the way in which the variables that have been isolated act in fact as a complex matrix. The single control of Penn represents the concentration of decision making already identified; the city he built was the creation of the cultural values by which he lived. As power was dispersed other values began to play their part, very different from the Quaker beliefs of Penn. The general layout of the whole area as well as part of the particular detail of the city of Philadelphia can however be fairly associated with the general cultural inheritance of the proprietor and his associates. In particular a contrast between the mode of settlement in the area and that of the Puritans in New England can be related to differences in the form of worship.

²⁶ A. N. B. Garvan (1966), 191.

²⁷ A. N. B. Garvan (1966), 196.

²⁸ A. N. B. Garvan (1966), 198.

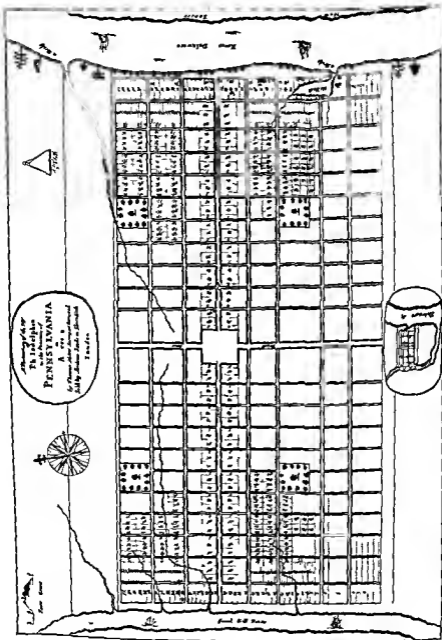


Figure 8-5 Philadelphia in 1682

radial concentric scheme in the early town plans of America. Reps writes, 'while one is inclined to give credit to an unknown tribal chief or priest, the honours must surely go to Driesbach (the founder) for realizing the potentialities of the site.' Here then the magico-religious significance of an Indian shape had been transformed into the layout of an American town. But by the time James Silk Buckingham visited the town in 1840 changes were in progress. So little veneration

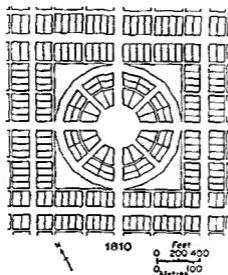


Figure 8-6 Circleville (Ohio) in 1810 After J. W. Reps (1965)

have the Americans for ancient remains, and so entirely destitute do they appear to be, as a nation, of any antiquarian taste, that this interesting spot of Circleville, is soon likely to lose all traces of its original peculiarities. The centre of the town contained, as its first building an octagonal edifice and the streets beyond this were laid out in a circular shape. But though the octagonal building still remains, the circular streets are fast giving way, to make room for straight ones, and the central edifice itself is already destined to be removed, to give place to stores and dwellings, so that in half a century or less, there will be no vestige left of that peculiarity which gave the place its name, and which constituted the most perfect and therefore

This aspect, of religious influence on plan, is one which deserves more attention than it has had. In extra-European areas cosmological forces have been particularly important and their significance within Europe has not been properly evaluated. Wheatley²⁹ in a critical review of Sjöberg's *Pre-industrial city*³⁰ argues that Sjöberg 'does less than justice to a principle related to that of symbolic centrality, and that is the construction of the city as an *imago mundi*, with the cosmogony as paradigmatic model'. Wheatley further points out that southeast Asian capitals were often laid out as images of the universe and quotes Groslier's interpretation of the temple-city of Kambujadesa, 'un diagramme magique tracé sur le parchemin de la plaine' or 'an expression in plastic terms of Khmer cosmological concepts'.³¹ The use of cardinal axes has been extremely widespread and even in terms of *cardo* and *decumanus* must preserve a basically cosmological purpose.

Again the well-known example of Angkor Thom demonstrates 'the minutiae of cosmic symbolism'. The city was surrounded with a wall and moat forming a square almost two miles on each side, its sides being directed towards the four cardinal points. There are gates in the middle of each side and a fifth one on the East leading to the entrance of the royal palace. The towers above the gates are crowned with the same fourfold faces of Lokesvara as those of the central temple. Thus, that smaller world, the city of Angkor, and through its means the whole Khmer empire were put under the protection of the "Lord of the Universe".³²

In Burma the ancient city of Srikshetra (Old Prome) was, according to tradition, built by the Gods themselves as an image of Indra's city Sudarsana. The remains of the city in fact show a circular layout.³³ In this context perhaps one of the most fascinating instances of cultural change is in the squaring of Circleville, a town situated in the state of Ohio in the United States.³⁴ The original settlement was established in 1810 after the establishment of Pickaway County. The site selected on the Scioto river was occupied by a large circular Indian earthwork and the new settlement was adapted 'to the shape of the circular enclosure'. This produced Circleville (figure 8.7), a unique

²⁹ P. Wheatley (1963) What the greatness of a city is said to be. *Pacific Viewpoint* 4, 163.

³⁰ G. Sjöberg (1960) *The pre industrial city, past and present* (Glencoe Ill.)

³¹ P. Wheatley (1963), 179.

³² R. Heine Geldern (1958) Conceptions of state and kingship in southeast Asia. *Southeast Asia Program Department of Area Studies data paper number 18, 34* (Cornell University).

³³ R. Heine Geldern (1958).

³⁴ This account is based on J. W. Reys (1965), 484-90.

form they knew and understood, and the symbolic preservation in the town form of the rites and usages of the Indians must have seemed particularly inappropriate. This seems to be at the basis of objections that the concentric scheme was a 'piece of childish sentimentalism' in the way it preserved the old tradition. It is certainly possible to regard the squaring of Circleville as an illustration of cultural forces at work and not merely as an economic exercise in convenience.

The last phrase '*an economic exercise in convenience*' introduces the problem of 'economic' influences on town plan. These are comparatively easy to demonstrate in a general sense since town growth is largely the consequence of economic forces. Perhaps the most distinctive work in this context is that of Ganshof in his study of the growth of towns between the Loire and the Rhine in the Middle Ages.³⁶ His specific intention is to study the physical extension of towns, '*nous nous sommes proposé de retracer le développement des villes dans l'espace*'.³⁷ The key to the physical pattern is seen by Ganshof to reside in the 'pre-urban nucleus' which was a strong point, most often a Roman town or fort which survived the turbulent period of imperial collapse to provide a point of security in later times. 'Thanks to their fortifications, these *civitates* and *castra* played the rôle of pre-urban nuclei in the formation of medieval towns. In other words, it is around this pre-existing Roman element that the medieval town is formed.'³⁸ Other nuclei were found in the castles of the nobility, particularly in Flanders and Brabant, whilst a third type was found in the residences of the emerging ecclesiastic hierarchy. All these had in common the offering of a degree of physical protection in a greatly disturbed world. But they were no more than *pre urban* nuclei, the element generative of growth was the new merchant or commercial quarters which were added to them. Commercial activity revived after the disruptions of the 'Dark Ages' and as it did so, it needed security above all else. Revived commerce became attached to the earlier nuclei which could provide protection and added a new and growing quarter to the old settlements. These agglomerations or suburbs (*sub urbium*) had distinctive names, *portus* (poort), *vicus* (vik) or in France, *burgus* (bourg). Thus there emerges the fundamental and characteristic difference which can be found in French towns between *cité* and

³⁶ F. L. Ganshof (1943) *Etude sur le développement des villes entre Loire et Rhin au moyen-âge* (Paris/Brussels)

³⁷ F. L. Ganshof (1943), 7

³⁸ F. L. Ganshof (1943), 27

the most interesting work in antiquity of its class in the country¹³⁶ Reps argues that the reasons for the change were that the lot shapes were awkward, that the central circle had soon degenerated and become unkempt and that the waste ground in the centre and at the angles where the circular section was joined to the surrounding grid

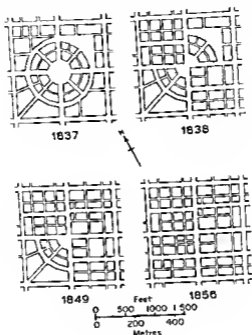


Figure 8-7 The squaring of Circleville After J W Reps (1965)

could be profitably used. The result was the 'squaring of Circleville' between 1837 and 1849 as shown in figure 8.7. Although sound economic reasons can be advanced for this odd episode in the development of American town plans, nevertheless it is possible to speculate that at the root of the matter was the fact that radial-concentric plans were not consonant with the cultural background of the settlers. The grid was the

¹³⁶ J S Buckingham (1842) *The eastern and western states of America* 1, 351 (London)

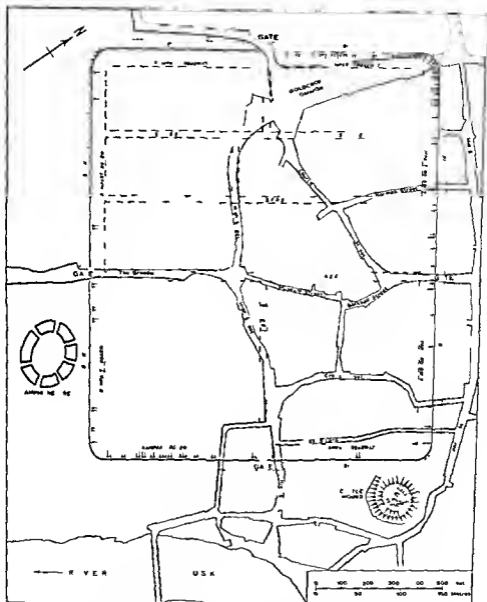


Figure B 9 Roman Isca and medieval Caerleon After V E Nash Williams (1954) Roman frontier (Card ff)

In this map the plan of modern Caerleon has been superimposed on that of the Roman legionary fortress. The general relationship is at once apparent as is the extent to which the post Roman period (after 375 A D) saw the loss of the rigid rectangular plan

bourg, between the old protective core and the new quarter of the merchants the bourgeoisie

Figure 8-8 indicates the basic structure of Bonn in West Germany. The Roman castrum on the Rhine bank was followed by the bishop's seat which was established some distance to the west with the basilica of Sankt Cassius at the heart. Bonn had, therefore, two elements of the pre urban triad of nuclei. The first fortification of the basilica was

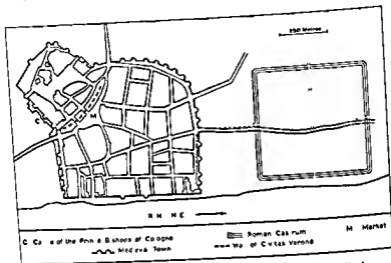


Figure 8-8 Bonn the basic plan structure After F. L. Ganshof (1943) For a commentary see text

probably undertaken at the end of the ninth century. Subsequently, with commercial development, the market was established at a characteristic point in front of the gate of *Civitas Verona*, the node about the basilica. Around this, the new plan element collected and, as in most cases, this was walled by 1243. Most often the market was at a focus of tracks which by use became the main thoroughfares. Since the area was outside the close control of urban institutions, haphazard building led to plans which lacked regular form. At Bonn the regularity of the Roman fort contrasts with the loose block pattern of the later mercantile town. Here the argument reverts to degree of political and institutional control bringing back into play a variable already discussed.

Ganshof's study is a clear indication of the way economic factors

themes of modern town planning should be 'traffic in towns'⁴⁰ The whole engineering and planning process is concerned with the analysis of traffic generation through origin and destination surveys and then the manipulation of the urban environment so that flows can be accommodated. This is not, therefore, a problem in street widening or reorientation alone, but involves the whole city complex. The minimization of travel by the compacting of such land use categories as need constant physical interaction is a vital part of this process, but also the complete or partial restructuring of the street pattern can be involved.

One of the instances of this process which can usefully be cited is the study of Newbury (Berkshire), a market town of some 30 000 population, which occurs in *Traffic in Towns*.⁴¹ The portion dealing with the town centre considers the relationship between accessibility and environment, an environment derived from the past and in which much of historical and architectural interest is retained. A series of proposals is made on an increasingly radical scale of development—minimal redevelopment, partial redevelopment, comprehensive redevelopment. These scales involve a successively greater alteration of the ground plan until at the comprehensive stage wholesale clearance and rebuilding is envisaged. 'The northern part of Northbrook Street is redeveloped with the whole of the ground level given over to parking and servicing with shopping and residential accommodation over.'⁴² The old layout under this scheme is virtually obliterated and a completely new plan comes into being in an attempt to combine 'highest standards of environment' with 'a very high level of accessibility'. The point at issue here is not concerned with planning principle or whether such a drastic remodelling of an old town will produce high environmental standards, that is to say, the concern is not with the merits of any form of plan but solely with the fact that the demands of modern accessibility can drastically reframe an old plan. Here then is another major variable which will determine the form of the town as it is on the ground and as it appears on the map.

This chapter on the study of town plan has necessarily striven to move away from the historical-descriptive orientation by which it is so frequently dominated. To some extent the way in which plan analysis

⁴⁰ Report of the steering group and working group appointed by the minister of transport (1963) *Traffic in towns* (London)

⁴¹ Report of the steering group (1963), 54 *et seq*

⁴² Report of the steering group (1963), 72

generate physical growth in particular locational situations. But the conclusions are directed towards general areas of growth rather than plan and although there are implications for layout they cannot be made explicit in the context of his study. It is apparent, though, that many of these new areas had little regularity in their layout, for it was not until an integrated combination of the fortified strongpoint and the centre of economic development was created in the *bastide* that once again the controlled chequer board layout was revived. This lapse of control is indeed mirrored in the way in which the later layout of Caerleon in Monmouthshire had deviated from the original Roman grid as the imperial control fell away and a period of local usage overlaid the older plan (figure 8-9).

It is perhaps in the context of circulation that economic influences on plan can best be made explicit. The basic function of the street system is to provide the most effective means of movement within the city. In nearly all cases, however, the present layout is inherited from a time when movement was on a very different scale and based on a completely different technology. It is from this that the traffic problems which now face all large cities result. But these features are apparent at a very much earlier period. The simple way in which the grid of Greek colonial cities was laid down is related to the fact that no adaptation to site was necessary. At Miletus the simple plan outline does not show that the streets across the slope took in actuality the form of elongated staircases, an arrangement peculiar to a situation where wheeled vehicles were not dominant and much was carried by mules which could negotiate the stepped streets. The distinction in medieval towns between street widths was often based on the function the streets were to perform. In larger towns, or in towns deliberately planned like the true *bastides* of southwestern France, the colonial towns of eastern Germany or Edward I's boroughs in Wales, it is generally not difficult to distinguish three functional types of streets though frequently they are combined in varying degrees. Major traffic streets (*Verkehrsstrassen*, *carrières* at Montpazier) connecting the restricted points of exit from the walled town commonly had the greatest width. Residential streets (*Wohnstrassen*), carrying traffic to and from adjoining residential plots only, were often narrower. Occupation roads (*Wirtschaftsstrassen*) providing subsidiary access, were the narrowest type.²³⁰

It follows from the close relationship between street layout and the functions which streets are called upon to perform that one of the major

²³⁰ M. R. G. Conzen (1960).

Notes on further reading

There are many histories of town planning and studies of individual towns but few attempts at plan analysis. A standard history of town plan development is

LAVEDAN, P. (1926-1932) *Histoire de l'urbanisme* (see footnote 7) 1 *Antiquité* 2 *Moyen âge*, 3 *Renaissance et temps modernes*, 4 *Epoque contemporaine*

Useful volumes in English are

BURKE, G. (1971) *Towns in the making* (London)

CURL, J. S. (1970) *European cities and society* (London)

HOORN, F. R. (1936) *Town building in history* (see footnote 6)

From a purely descriptive and gazetteer point of view, an interesting series is

GUTKIND, E. A. (1964 cont.) *International History of City Development* (London)

1 *Urban development in Central Europe* (1964) 2 *Urban development in the Alpine and Scandinavian Countries* (1965), 3 *Urban development in Southern Europe, Spain and Portugal* (1967), 4 *Urban development in Southern Europe Italy and Greece* (1969), 5 *Urban development in Western Europe France and Belgium* (1970) 6 *Urban development in Western Europe Great Britain and the Netherlands* (1971), 7 *Urban development in East Central Europe* (1972), 8 *Urban development in Eastern Europe* (1972)

Another series dealing with a number of separate topics is

COLLINS, G. R. editor (n.d.) *Planning and cities* (London)

Three books concerned with Britain are

ASHWORTH, W. (1954) *The genesis of modern British town planning* (London)

BELL, C. and R. (1967) *City fathers, the early history of town planning in Britain* (London)

LOREL, M. D. editor (1969) *Historic towns, maps and plans of towns and cities in the British Isles*, 1 (Oxford). This is a fine source of studies on individual towns

Two books which deal with the U.S.A. are

TUNNARD, C. and REED, H. H. (1955) *American skyline* (Boston)

REPS, J. W. (1965) *The making of urban America* (see footnote 8)

One of the few geographical works which deals with townscape as such is

JOHNS, E. (1965) *British townscapes* (London)

An excellent example of a volume devoted to one particular form of town is

BERESFORD, M. (1967), *New towns of the Middle Ages* (New York Washington)

Some of the most stimulating writing on the religious element in town origins and layout is by Wheatley

WHEATLEY, P. (1967) *Proleptic observations on the origins of urbanism*, in R. Steel and R. Lawton, Editors (1967) *Liverpool essays in geography*, 315 (London)

Wheatley's major work is

WHEATLEY, P. (1971) *The pivot of the four quarters* (Edinburgh)

has been approached reflects the nature of cities in Europe and North America. In the latter area the dominance of the grid and the apparent lack of interesting variety has meant a relative neglect of plan studies, whilst in Europe the rich detail of plan has effectively directed research into the complexities of the unique. The work of Reps has effectively disposed of the first notion, at least in relative terms. As geographical studies progress, the latter notion, that plan is so unique that no generality can be abstracted, is also becoming outdated. Certainly Conzen has taken the first step in the presentation of general notions. The critical issue seems to be the overt recognition that plan itself is the product, as are so many geographical features, of an extremely complex set of variables, that plan can be interpreted through these variables and that many more studies are needed which will look at the plan forms generated by a particular variable rather than at one plan. Further complexity is, of course, added to the situation by the fact that of all the elements the urban geographer studies, plan is the slowest changing. In consequence, much of what is now visible is the result of the progressive modification of older, and in some cases very much older, forms. It is not surprising, given the intractable difficulties, that progress in the introduction of generality and theory to plan analysis has been very limited. It has been suggested that since a plan is basically, though not solely, a network, it could be interpreted in terms of network analysis. But it is doubtful whether refined description would add greatly to comprehension and certainly many of the operative variables cannot be quantified. There seems little hope of feeding into a multivariate analysis a large array of variables in order to abstract those sets of prime importance. Certainly a start has been made in relation to these problems although at the time of writing the material is in the form of doctoral dissertations⁴³ and working papers.⁴⁴ Even so the recognition of current plan elements and the attempt to isolate the operation of any one or combination of the large range of variables appears to offer an avenue of progress in contrast to the cul de sac in which plan studies have been lodged so long.

⁴³ S. Openshaw (1974) *Processes in urban morphology with special reference to South Shields* Unpub. Ph.D. dissertation Univ. Newcastle on Tyne. H. A. Milward (1975) *The convergence of urban plan features: a comparative analysis of trends in Canada and England* Unpub. Ph.D. dissertation Univ. of Western Toronto.

⁴⁴ H. A. Milward (1974) *A comparison and grouping of ten Canadian cities with respect to their street plan*. Paper presented at the annual meeting of the Canadian Assoc. of Geogrs. (Ontario Division).

9 URBAN LAND-USE: GENERAL PROBLEMS

The range of studies which is covered by the simple phrase 'urban land use' is vast in the extreme and includes contributions from all the disciplines which conventionally fall within the social sciences. Many of these studies are basically aspatial in context and therefore would seem not to come within the purview of geographical investigation. But this distinction between work irrelevant and relevant to urban geography is difficult to sustain, for very often as the chain from a spatial location is traced back the beginnings are found in a concept which appears essentially aspatial. For example, 'social distance' is a sociological concept to be studied within the structural-functional context of that discipline. Laumann,¹ following the much earlier study of Bogardus,² defines subjective social distance as an attitude of ego toward a person (alter) with a particular status attribute,³ this attribute in the study he presents is simply 'occupation'. But it is at once apparent that, in terms of the selection of a residential site, subjective social distance could be related to a physical distance and immediately an aspatial sociological concept becomes a spatial locational, that is a geographical, factor. It follows that at the outset it is essential to stress that the urban land use pattern is the consequence of a large number of operative forces and that most generalizations attempt to ignore many of them. The basic geographic interest is in land use as a distributed feature or as an aspect of areal difference. But the approach adopted in this general chapter is to begin with the early attempts to survey the whole city structure as one unit in the search for an overriding explanation. This, it is true, was not part of the early geographical tradition which was much more concerned with the interpretation of the particular land use map of one city as an exceptional or unique case. However, the general schemes proposed by Burgess and his followers were rapidly adapted from the field of human ecology, in which they were proposed, into geographical studies and most works on particular cities concluded

¹ E. C. Laumann (1966) *Prestige and association in an urban community* (Indianapolis Ind.)

² E. S. Bogardus (1925) *Measuring social distance* *J appl Sociol* 9, 299

³ E. C. Laumann (1966) 4

In the context of plan analysis itself two works by Conzen are essential reading
CONZEN, M R G (1960) Alnwick a study in town plan analysis (see footnote
10)

CONZEN, M R G (1962) The plan analysis of an English city centre, in
K Norborg, Editor, (1962) *Proceedings of the I G U symposium in urban
geography Lund*, 1960, 383 (Lund)

A further work which attempts to set up a framework for studying urban
morphology is

BADCOCK, E A (1970) A preliminary note on the study of intra urban
physiognomy *Prof Geogr* 22, 189-96

with a statement of the extent to which the town under consideration matched the generality of concentric zonal or other postulated patterns. As the ecological emphasis on sub-social processes of competition for space became marked there was an increasing trend toward the emphasis of economic variables and accordingly the more direct statement of land-use schemata was made in the context of the land market and of economics, theory of urban land-use became an essential part of land economics. But the strong reaction to these mechanistic explanations clearly revealed that the abstraction of a limited set of economic variables from the whole complex set acting on land use was an unsatisfactory procedure. Moreover, much of this tradition was derived from the geographer's land-use map, a statement of an aggregate situation. As in other fields the most promising line of approach changed from the derivation of generalizations from the completed aggregate state to the analysis of individual personal or corporate need so that the total land-use was seen as the consequence of a very large number of separate activity systems, each having individual characteristics and reacting not in the abstract but in the context of a given set of structures which compose the actual city. From this summary it is possible to isolate three main approaches

- 1 The ecological
- 2 The economic
- 3 Via activity systems

These three approaches can be examined in terms of the overall land use pattern and subsequently identified in a discussion of the various parts of the town as they have conventionally been isolated in land use studies

I HUMAN ECOLOGY AND URBAN LAND USE

E. W. Burgess's thesis⁴ that urban land use tended to display a zonal organization concentrically arrayed about the city centre (figure 9.1) has for the last forty years been the starting point for most considerations of the utilization of land in cities. Each succeeding author has outlined the concentric zone scheme, or theory as it is sometimes called subjecting it to what is now a fairly standard critique. Since this process continues it would seem that the concentric zone scheme must either present something of value or be the only generalized statement available, and is, therefore, presented *faute de mieux*.

⁴ E. W. Burgess (1925) *The growth of the city* an introduction to a research project, in R. E. Park and E. W. Burgess editors (1925) *The city* 47 (Chicago)

parts of the city during the process of growth and expansion. Undoubtedly Burgess's presentation was sketchy and muddled. The zones are related partly to generalization based on evidence from Chicago and other cities, partly to the processes of city growth, partly to the sub-social ecological forces of competition then dominating the thought of the 'Chicago School'.

Reactions to the concentric zone model can be considered under three headings. Most critiques contain elements of all three and the division is one of convenience of review. The divisions are

- 1 Destructive criticism which rejects the thesis
- 2 Criticism which lays emphasis on factors which were either excluded by Burgess or to which he gave little weight
- 3 Attempts to exclude historical process and to evaluate the implicit assumptions on which the thesis is based and hence recast the whole argument in deductive form

These can be considered in turn

a Rejection of the Burgess model

There are four closely related bases on which a direct rejection of the usefulness and validity of the model set up by Burgess has been proposed

(i) *Gradients as against zonal boundaries* This line of criticism is usually linked to a paper by M. R. Davie, 'The pattern of urban growth' 10. Beginning from the position that 'very often distorting factors so frequently disrupt or obscure the concentric circle pattern so as to make it useless as a tool for study', Davie goes on to introduce the notion of gradient, that is of the rate of change of any variable condition away from the city centre and toward the periphery. If a truly zonal situation is to be found then these gradients should show marked breaks at the successive zonal boundaries, much as in meteorology a 'front' marks the dividing line between two air masses of contrasted characteristics. Using a study of delinquency rates in Chicago, the city from which Burgess derived his model, Davie argued that although there was a decline from the city centre 'there is nothing which would suggest a combination into concentric zones.' 11 That is although significant changes were associated with distance from the city centre, they did not show a grouping or greater rapidity of change at any zonal boundaries—or in terms of the simile used above, there were

Recent concern with model building in the social sciences has to some extent put Burgess's scheme upon a more elevated plane. It can quite justifiably be considered a normative model, 'a simplified structuring of reality which presents supposedly significant features of relationships in a generalized form'.⁵ Comparison is at once suggested with Christaller's statement of central place theory⁶ as another early model concerned with spatial and locational aspects within the social sciences. But here little progress can be made, for Burgess does not deduce a structure from a series of initial assumptions. His model is explicitly inductive and presumably intuitively derived from the observation of a large number of American cities in general, and of Chicago in particular, though the process is not made clear in his chapter on 'The growth of the city'—an introduction to a research project in the book *The city* written with R. L. Park in 1925. The scheme is baldly introduced: 'The typical process of the expansion of the city can best be illustrated, perhaps, by a series of concentric circles which may be numbered to designate both the successive zones of urban extension and the types of areas differentiated in the process of expansion'.⁷ Moreover, there is a strong historical element in the scheme, for when process is introduced (in terms of invasion and succession and concentration and decentralization) it is envisaged in the historical context of the growth of the American city and not in terms of contemporary forces creating by their interaction an equilibrium condition which is the land use pattern. Nevertheless it is a model in the proper sense of the term. It was to Burgess 'an ideal construction of the tendencies of any town or city to expand radially from its central business district'. Encircling the downtown area there is normally an area of transition which is being invaded by business and light manufacture. A third area is inhabited by the workers in industries who have escaped from the area of deterioration but who desire to live within easy access of their work. Beyond this zone is the 'residential area' of high class apartment buildings or of exclusive 'restricted' districts of single family dwellings. Still further, out beyond the city limits, is the commuters' zone—suburban areas, or satellite cities.⁸ This sketch of the concentric zones is immediately followed by a section which firmly links it with a historical process, 'the tendency of each inner zone to extend its area by the invasion of the next outer zone',⁹ so that in the early history of Chicago all zones were included within the inner zone but have emerged as distinctive

⁵ P. Haggett and Chorley R. J. (1967) *Models, paradigms and the new geography* chapter 1 in *Models in geography* 22 (London)

⁶ See chapter 6 page 70

⁷ E. W. Burgess (1925)

⁸ E. W. Burgess (1925) 49

⁹ E. W. Burgess (1925)

modern conditions and a new framework is needed for the systematic study of the complexity of urban life. Some would even say that the situation is now so complex that it is impossible to devise an overall framework of any kind and that it would be better to concentrate on the study of a number of typical areas.¹⁶ This latter view is one of clear rejection, although how what constitutes a 'typical area' is to be isolated and defined is not made clear.

(iii) *The scheme is anachronistic* It will be noted that in the quotation at the end of the above paragraph there occurs the statement that the theory under review 'may no longer be related to modern conditions. Since Burgess's model was stated in a historical context this is a fair comment, and therefore, though the zonal scheme might have been apposite for the American city of the 1920s, it is certainly not useful for world wide application in the second half of the twentieth century (see figure 9.2)

(iv) *The scheme lacks universality* It is only just to record that Burgess made no claim that the model had relevance other than to rapidly growing, industrialized American cities, but inevitably it has been taken as universally applicable to all cities. The examination of what he calls 'the pre-industrial city' by Gideon Sjoberg¹⁷ effectively disposes of this extension. Sjoberg demonstrates that the city prior to industrialization, both in a historical and a spatial context, displays a structural pattern which is a negation of the concentric zone scheme in all ways. Three major aspects of this contrast are emphasized.

1. 'The pre-eminence of the centre over the periphery especially as portrayed in the distribution of social classes'.¹⁸ In this context of the 'pre-industrial' city the privileged classes, the elite, gather at the centre because of their need for the closest association with the governmental and religious buildings which physically and symbolically represent political power. 'Because political and religious activities in feudal cities have far more status than the economic, the main market though often set up in the central sector, is subsidiary to the religious and political structures there. The commercial structures in no way rival the religious and political in symbolic eminence, typically these tower above all others. These land use patterns refute the still widely accepted proposition of the Chicago School that the 'central business district' is the

¹⁶ E. G. Trus (1964)

¹⁷ G. Sjoberg (1965) *The pre-industrial city past and present*

¹⁸ G. Sjoberg (1965), 95

no 'fronts' There is some danger that this sort of criticism can fall into the rather arid 'core' versus 'boundary' argument so familiar in regional geography, but certainly gradient studies have failed to demonstrate the sharp changes which are implicit in the concentric zone model These criticisms are perhaps more important in that they are closely associated with and lead into the second basis for rejection

(ii) *Internal heterogeneity of the zones* The notion of well defined boundaries around clearly distinctive ecological 'regions' is to some extent linked with Park's idea of the 'natural area'¹² Hatt distinguished two emphases within this one concept 'one of these views the natural area as a spatial unit limited by natural boundaries enclosing a homogeneous population with a characteristic moral order The other emphasizes its biotic and community aspects and describes the natural area as a spatial unit inhabited by a population united on the basis of symbiotic relationships'¹³ In both of these the words 'a spatial unit' emphasize the common core of the concept — the existence of well contrasted, discrete social areas within the city But Hatt proceeded to demonstrate that such natural areas 'do not exist' and followed by making the distinction between 'natural areas as logical statistical constructs integrated with a plan for research' and the 'concept of natural areas as a series of spatial and social factors which act as coercive influences upon all who inhabit the geographically and culturally defined area'¹⁴ This latter view, Hatt argued, involved the 'reification' of a concept which was useful as a way of organizing data and in approaching the complexity of the city but useless and dangerous if it were elevated to a tenet of faith and conditioned research direction If the natural areas were considered in this lesser way as units for organizing data then there were clear implications for the concentric zones, for they were demoted from the 'natural' products of ecological processes to mere useful devices in statistical analysis, in the manner that examination of data by distance zones and directional sectors has often been used Moreover that analysis would demonstrate the amount of internal difference 'variations within the main zones of development were no less important than differences between them'¹⁵ Seen as having no basic ecological justification and displaying much internal variation, the zones lost most of their significance 'The theories of Burgess and Park may no longer be related to

¹² R. D. McKenzie (1925) *The ecological approach to the study of the human community* in R. E. Park and E. W. Burgess editors (1925), 77

¹³ P. Hatt (1946) *The concept of natural area* *Am. sociol. Rev.* 11, 423

¹⁴ P. Hatt (1946) 427

¹⁵ E. Gittus (1964) *The structure of urban areas, a new approach* *Tn. Plann. Rev.* 35, 7

hub of urban living, a generalization fulfilled only in industrial cities¹⁹

- 2 'Finer spatial differences according to ethnic, occupational and family ties'²⁰ There is a characteristic segregation along these various lines. A prime example is the ghetto of the medieval European city or indeed the monopolization of some areas by particular crafts which is still visible in the street or quarter names of contemporary cities. It should be stressed that in chart 2 of his chapter on the growth of the city, Burgess clearly showed a 'black belt' in Chicago which cut across the concentric zones. 'Wedging out from here is the black belt,' he wrote almost using a sectoral terminology (figure 9-1A).
- 3 'The low incidence of functional differentiation of land use patterns'²¹ The multiple use of single plots is a further characteristic of the pre-industrial city as for example in the use of church land for market places, even the use of the church yard itself, those who were buying and selling in the outer court of the Temple at Jerusalem were doing so in a typical location. Again more often than not merchants and artisans live at their place of work in quarters above or behind their shops so that there is not that essential division of place of work and place of residence on which the concentric zone scheme is based. This, of course, is partly a consequence of a technology unable to provide the necessary rapid transport to make this feasible.

'To reiterate, the feudal city's land use configuration is in many ways the reverse of that in the highly industrialized countries'²² (figure 9-3). Although it is not necessary to accept Sjöberg's terminology his views have been expounded at some length since they so effectively demonstrate that Burgess's model depended not only upon those processes which human ecologists called sub-social (but which seem to have simply been economic competition for a scarce commodity, that is central city land) but also upon a whole array of social and technological conditions which were never made explicit and which were often ignored when the model was seized upon as being universally applicable.²³

There is no need, however, to look at such widely diverging areas and times to make the point that Burgess's model is limited in universality. The location of British municipal housing estates (figure 9-2) shows that the simple notion of a rise in social status with distance from the

¹⁹ G. Sjöberg (1965), 97

²⁰ G. Sjöberg (1965), 95

²¹ G. Sjöberg (1965), 96

²² G. Sjöberg (1965), 103

²³ For elaboration see page 183 *et seq.*

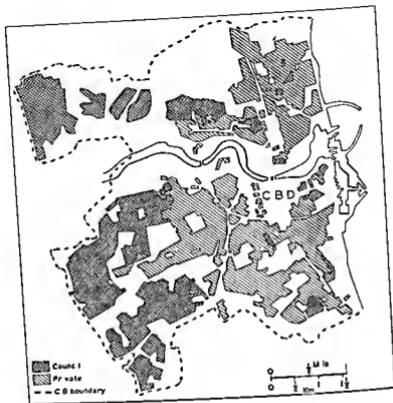


Figure 9-2 The distribution of municipal housing in Sunderland After B T Robson (1969) Although the distribution is limited to the confines of the administrative area it shows clearly the areas in which peripheral municipal housing has been located This sort of decision in essence part of political processes undermines the simple notions of market forces as the creator of concentric zonal patterns of land use

city centre is not true. These estates are the consequence of an entirely different set of socio-political forces than those moulding the American city in the 1920s, when American municipal authorities were effectively not in the house constructing business. Once one moves outside the 'American culture province' and tries to interpret city patterns created by different social economic political technological (i.e. cultural) conditions, then the applicability of American based concepts and models becomes less than complete.

The whole tenor of the four lines of criticism which have been outlined is to reject the Burgess model on two major grounds. First, it is limited historically and culturally to a particular situation at a particular time in a particular country, and second, even then it quite arbitrarily emphasizes clear cut boundaries which cannot be justified by gradient study and assumes a natural sorting of distinctive areas, whereas the city is in reality a most complex patchwork which defies the massive generalization. Many of these criticisms will be familiar to geographers, for fundamentally they question the existence as such, of natural areas (or regions) other than as the constructions of the investigator, and hence also the validity of the boundaries which demarcate them. To adapt a sentence critical of the regional geographer to apply to Burgess, he may be accused of drawing lines that don't exist around areas that don't matter.²⁴ In some ways these various attacks make elaborate parade of a simple theme, that the model of concentric zones is too simple and too limited in historical and cultural application to carry one far into an understanding of land use patterns. With this clearly understood the model remains useful as a first approximation and as a pedagogic device, it is no longer a spring-board for research.

b Extension of the Burgess model

Since the concentric zone model excludes a wide variety of factors which affect urban land use it is possible to introduce many of these in extensions of the model. Four of these can be considered here, the

²⁴ G. H. T. Hamble (1951) *The inadequacy of the regional concept*, in D. Stamp and S. W. Wooldridge editors (1951) *London essays in geography* (London).

Figure 9.3 The social areas of Popayan, Colombia. This map clearly depicts the reversal of the concentric zone arrangement of urban land uses in a town of pre-industrial character. The central association of the upper class residential areas with the central institutions emerges clearly. After A. H. Whiteford (*nd*). Two cities of Latin America (New York).



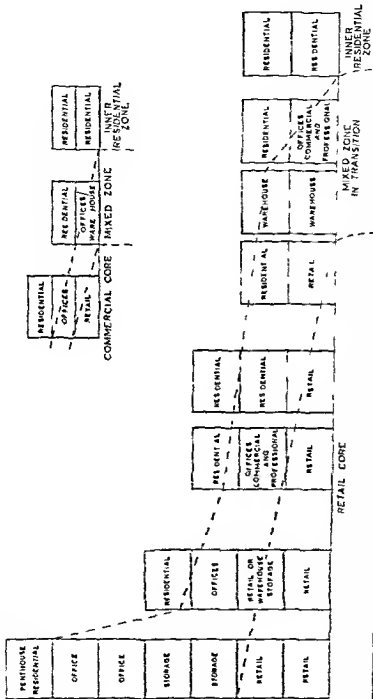


Figure 9-4: The relation of land-use to building height. The upper diagram shows a more simplified form of the larger diagram. These are only generalized sketches to demonstrate the principle of the way in which each zone of the concentric scheme in fact overlies the other at the city centre.

first and the last perhaps not standard inclusions but the middle two now invariably sketched alongside the Burgess model

(1) *The introduction of building height* There is an implication in the concentric zone model that the city is a two dimensional feature and little attention was paid in its formulation to the height of buildings and the variation of use with height. It is quite simple, however, within the overall limits of the model itself, to introduce this feature. Accessibility not only diminishes outward from the centre but upward from the ground. If the vertical changes in use are examined they are often found to parallel the horizontal changes. This is depicted in figure 9.4. Characteristically in the smaller town the ground floor retail shop has office space above, frequently occupied by legal or insurance firms whilst above this is an apartment or maisonette. This parallels the horizontal sequence. Types of use which cannot effectively compete for a desired central location because of the high costs are relegated to the transitional or mixed fringe which surrounds the CBD or they are relegated to the upper floors of centrally located buildings. The whole model can, therefore, be thought of as a flattened dome reaching its highest point at the peak land value and with a series of bands of land-use taking off progressively from the outer edges, thinning markedly towards the centre where they overlay each other at the central vertical axis.²⁵ Thus logically the outermost commuter zone, where there are the most valued residential locations, would form the uppermost layer of the dome at the centre where it is found in the form of penthouse flats and apartments. This extension into the vertical has only been sketched here and would involve a number of problems if strictly interpreted. It suggests, however, an area of extension of the model in need of more thorough and logical exposition.

This brief presentation illustrates the way in which extensions can be made. Some of these have reached absurdity, as in the one that suggests the model should consist of squares rather than circles since most American cities are built on a grid plan.²⁶

(2) *The emphasis of sectors* The earliest constructive criticism of Burgess was best presented in a volume by Homer Hoyt published in 1939 by the United States Federal Housing Administration and

²⁵ It will be seen that this is in fact a very different shape from that which is given by the analysis of urban land values or indeed from that of the average city with its tall central buildings. But there is no basis (keeping within the context of Burgess's arguments) to make it other than the shape indicated.

²⁶ E. Bergel (1955) *Urban sociology*, 109 (New York).

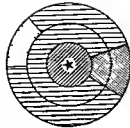
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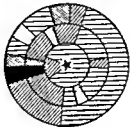
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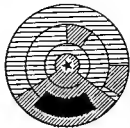
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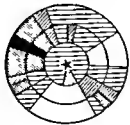
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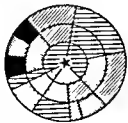
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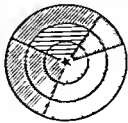
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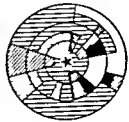
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Figure 9-5. The theoretical pattern of rent areas in twelve American cities *After H. Hoyt (1939)*. These are 12 of the 30 examples depicted by Hoyt. He arranged the rent areas to correspond to an ideal pattern of concentric circles and concluded from this evidence that rent areas in American cities tend to conform to a pattern of sectors rather than of concentric circles.

entitled *The structure and growth of residential neighborhoods in American cities*.²⁷ After conducting a factual examination of residential rent patterns in twenty-five widely distributed cities in the USA, Hoyt concluded that 'there is nevertheless, a general pattern of rent that applies to all cities. This pattern is not a random distribution. It is not in the form of sharply defined rectangular areas, with blocks in each rental group occupying completely segregated segments. It is not in the form of successive concentric circles. Even when the rental data are put into a framework of concentric circles there is revealed no general gradation upward from the centre to the periphery. From the evidence presented, therefore, it may be concluded that the rent areas in American cities tend to conform to a pattern of sectors rather than of concentric circles'.²⁸ (See figures 9-1C and 9-5.) Thus Hoyt presented what has been called the 'sector theory'. As the title of the volume where it appeared suggests, he was concerned primarily with residential uses and the key to the sector arrangement was to be found in the location of the high quality areas. These, Hoyt maintained 'do not skip about at random in the process of movement—they follow a definite path in one or more sectors of the city',²⁹ that is they are extended outward along communication axes thus producing the sector, they do not encircle the city at its outer limits. In this process certain features exercise a dominant influence. These are, in addition to communication lines, high ground free from flood danger, open country with no physical barriers, the homes of community leaders, the attraction of office blocks and stores which also move, established outlying business centres and the operation of real estate promoters. At the same time, as is evident from the foregoing list, some land-uses will attract each other, as in the move of quality residence to outlying business centres while some will repel each other. Thus heavy industry will also probably extend along a line of communication, be it railway or waterway, and also occupy a sector—but one which due to repulsion will be located directly away from the high quality residential sector (figure 9-1C). Essentially, therefore, the *directional* element will control land use contrasts rather than distance, and accordingly the city structure becomes sectoral in character. Hoyt did not discount the distance variable but rather added the further directional element which he considered vital in any attempt to give more reality to Burgess's model: he was adding a further degree of verisimilitude at the expense of simplicity.

²⁷ H. Hoyt (1939) *The structure and growth of residential neighborhoods in American cities* (Washington).

²⁸ H. Hoyt (1939), 73-6.

²⁹ H. Hoyt (1939), 114.

at the present moment by examining different size classes of town. It should be possible to trace a progression from the smallest settlement where there was no apparent *differentiation of uses*, to the next class where a fairly well defined residential ring has become segregated and surrounds a core of mixed but mainly non residential uses. The next size class is characterized by the crystallization of a retail core with a mixed surround which is partly the product of the expulsion of non-retail uses as the core developed and their taking over of premises in the first residential ring. And so on through to the metropolis. It must be emphasized that these are identified as the characteristics of size classes, not stages in the growth process. Nevertheless this immediately brings to mind the attempt by Griffith Taylor to formalize the sorts of contrasts which have been outlined. His scheme recognized

<i>Infantile towns</i>	Haphazard distribution of shops and houses, no factories
<i>Juvenile towns</i>	Differentiation of zones begins, shops are separated
<i>Adolescent towns</i>	Scattered factories, but no definite zone for first-class houses
<i>Early mature towns</i>	A clear segregation of first-class houses
<i>Mature towns</i>	Separate commercial and industrial areas, four zones of houses, ranging from mansions to shacks

This is an inadequate table²¹ in almost every way. The use of terminology adapted from the cycle of erosion as propounded by W. M. Davis is ill considered and completely inappropriate, above all it is unnecessary since the characteristics outlined are correlates of size and possibly of economic base. Indeed Taylor wrote size into the text indicating, for example, that the population of the 'juvenile town' would be about 20,000 but then arguing, with some justification but little proof, that 'stage' and 'population' need not be closely associated. There are problems, in its early stages a crude mining town may have a large population yet remain still little more than a 'camp', but these are problems partly associated with the 'economic base'. The progressive differentiation of uses in Taylor's 'cycle' is but thinly indicated and not rigorously pursued. His identification of 'the various ages of towns' is, therefore, not very impressive and is seldom quoted in the literature of urban geography, but it pointed in the right direction and posed questions which have yet to be effectively answered. If the appearance of segregated land uses is part of the urban growth process, at what town sizes or at what hierarchical grades and in what manner does this differentiation take place and under what functional conditions?

²¹ G. Taylor (1949) *Urban geography*, 421-3 (London)

(iii) *The emphasis of multiple nuclei* A model made up of a number of separate nuclei was proposed by C. D. Harris and L. L. Ullman.³⁰ It was conceived as a further move away from the massive generalization and toward reality. It is an observed fact that many towns and nearly all large cities do not grow simply about a single central business district but are formed by the progressive integration of a number of separate nuclei into the urban fabric—hence the suggestion of a multiple nuclei model. These nuclei, and further districts which become specialized and differentiated in the growth process, are not located in relation to any generalized zone or distance attribute, but rather are they bound by a number of controls which produce a pattern of characteristic associations between the nuclei. These are

- 1 Certain activities require specialized facilities. Thus the retail district demands maximum accessibility, something quite different from geometrical centrality.
- 2 Like activities group together since they profit from association, hence the specialized legal districts or theatrelands. In short, there are external economies.
- 3 Some activities repel each other, as in the separation of high quality residences from industry.
- 4 Some activities cannot afford the high rents which the most desirable sites, relative to their interests, demand.

It will be apparent that none of these was very new (they had been noted by Burgess and Hoyt), but Harris and Ullman argued that during the historical growth process these influences would condition the emergence of separate areas, neither zones nor sectors, forming in effect a patchwork but where there were clear controls as to which 'patches' were joined together (figure 9-1D).

(iv) *The introduction of a size variable* In presenting his model Burgess used the words 'great cities' and 'our largest cities' and he clearly had in mind a process which applied to the largest cities. But how large are 'great' and 'largest'? Burgess himself stated that all the zones were contained in one when Chicago was but a small and primitive settlement. The concentric zone model does not apply to the large metropolis where the simple concept of a CBD has fragmented into a large number of specialized tracts—financial, legal, retail, theatre areas to identify only the beginnings of specialization. The conclusion from this is that if the evolution of the zones from a 'primitive cell' to a great city can be traced historically, then this same process should be identifiable

³⁰ C. D. Harris and E. L. Ullman (1945) The nature of cities *Ann. Am. Acad. Pol. Sci.* 242, 7.

assimilation as well as in social class and occupations³³ This would hardly seem essential, particularly if the model were only to take in 'large' western cities when occupational and class differences are implicit.

- 2 Assumption of an economic base Certainly a mixed industrial-commercial city was implied by Burgess, but a much greater clarity is to be obtained if a certain economic functional character is specified.
- 3 Economic and cultural assumptions Burgess assumed those conditions which were appropriate in the America of the 1920s, such as private ownership of property, economic competition and efficient transport, equally easy, rapid and cheap in all directions.
- 4 Assumptions as to the geometry of space Schnore adds this to the earlier listing by Quinn. He maintains that it is necessary to assume a single centre (hence disposing of the multiple nuclei problem) and that physical area increases as the square of radial distance and consequently that space is in shortest supply at the centre. In addition there is the further necessary condition that central areas are most highly valued by virtue of short supply and accessibility to all other areas Competition for these central locations leads to a 'sifting and sorting' with physical positions largely determined by economic ability to compete for space.
- 5 The assumption of occupancy patterns Schnore argues that for the Burgess model it is necessary that social classes with superior economic status will be able to pre-empt the newer and more desirable areas, or will at least have a high degree of freedom of choice as against a very restricted choice for the poor

But even starting from this list comparatively little progress has been made in the presentation of a convincing argument. Schnore proceeds to list variables rather than deduce an urban arrangement. To some extent this somewhat limp end is partly bound up with the development of human ecology itself in this particular context. The classical ecologists had been concerned to demonstrate parallels with plant ecology and hence they looked upon urban land as subject to competition from rival interests carried on at a 'sub-social' level 'The basic process in human relationships is competition largely involving a struggle for space' In this process 'human society was seen as organized on two levels the biotic and the cultural The biotic level involves basic, non thoughtful adjustments made in the struggle for existence. The level is regarded as sub-social The cultural level is seen as a superstructure and excluded from human

³³ J. A. Quinn (1900) *Human ecology*, 120 (New York)

Perhaps it is sufficient here merely to point out that Burgess's model clearly involved a size variable which was barely considered, although held constant by implication, let alone worked out in detail.

This brief review of models which have aimed at generalizing the total land use pattern of a city has demonstrated some of the ways in which Burgess's original scheme has been extended. These extensions are the product of an inductive approach, the thesis being that knowledge of land use in a large number of cities will show that there is little correspondence between model and reality. If, therefore, further variables are introduced—size, height, axial growth, multiple nuclei—then progress will be made by making the generalization 'more real'. But as this is done so too some of the grand simplicity of the original is lost. Indeed one questions whether the 'multiple nuclei' model can rightly be so called. It is based on well known statements regarding uses and makes no marked contribution to their complex association in area in a locational sense. At an earlier stage a quotation from Hoyt was introduced denying that land uses formed a patchwork, multiple nuclei theory argues that they do and because of this ought perhaps to be associated with the destructive criticisms rather than those which modify. Perhaps it is worth repeating that Burgess's original formulation of a concentric zone model remains as still providing stimulating insight into land use patterns and if it has lost the relevance to the formulation of research projects and designs which it had in the 1920s, it is still a most useful pedagogic device for approaching the complexities of the problem it seeks to illuminate. Perhaps this is why the more frequently it is dismissed as no longer of relevance, the more consistently it appears in texts such as this.

c The presentation of the Burgess model in the form of a deductive theory

As dissatisfaction with the concentric zone scheme of urban land use grew, so sometimes explicitly, sometimes implicitly, attempts were made to reframe the model as the end product of a deductive argument. In this process a statement of premises becomes essential, making the assumptions on which the model rests the subject of elaboration. The clearest exposition of these assumptions is that by Leo F. Schnore³² who lists five:

1. Assumption of heterogeneity. This is a restatement of Quinn's argument that widely contrasted population types are a prerequisite. Quinn envisaged contrasts in race and in degree of cultural

³² L. F. Schnore (1965) On the spatial structure of cities in the two Americas chapter 10 in P. M. Hauser and L. F. Schnore editors (1965) *The study of urbanization* 353-4 (New York)

the identity or solidarity of a small cultural system may acquire spatial articulation.' His work on central Boston emphasized, for example, the value system derived from a cultural heritage which gave Beacon Hill its distinctive character and determined its residential status unrelated to any distance or directional controls. This objection may be restated in the form that culturally rooted values exert a 'causative' influence on urban land use patterns. The second sort of adaptation was termed 'rational', since interests dominate the spatial adaptation of certain social systems.²⁷ This is nearer the economic approach of his precursors in human ecology but even so Firey argued 'these interests come directly from broader and larger cultural systems. This objection to economic determinism may be stated in the form that market forces themselves stem indirectly from larger cultural controls: they are not self-generated.

(ii) *The place of social power in the determination of land-use* This aspect of land use determination has been best stated by W. H. Form.²⁸ He prefaces his case with a plea for models which consider social reality and not solely economic abstraction. In particular he argues that it is necessary to discard the idea of a free unorganized market in which individuals compete impersonally. This done it becomes imperative to identify who are the largest consumers of land, which organizations deal in land and which associations mediate conflicts of land use. He identifies four organizational complexes which are dominant: the real estate and building businesses, larger industries, businesses and utilities, individual home owners, local Government agencies. The problem then becomes the exposure of the resources or influence which each of these can deploy, their functions in terms of the land use market, the nature of their internal organizations, the accountability of the groups and the 'image of the city' within which each group works and the 'values' they consider paramount. Finally it is necessary to consider the relations between them much as one would study a collective bargaining process in industry. This provides a very different view of the sorting process from that of the classical ecologists.

In conclusion to this section dealing with human ecology and land use it would seem reasonable to infer that work on ecological lines has reached an impasse. Its predominant economic bias has little to offer

²⁷ W. Firey (1947) *Land use in central Boston* 34 (Cambridge Mass.)

²⁸ W. Firey (1947)

²⁹ W. H. Form (1954) 'The place of social structure in the determination of land use: some implications for a theory of urban ecology' *Soc. Forces* 32, 317

ecology.³⁴ This framework might be applicable to the study of diseases or the spatial arrangement of a primitive population but if the land-use pattern is to be interpreted in this way two problems immediately arise

- 1 The more the concept of sub-social competition for a scarce resource is examined and refined the more the ecologist is taken directly into the field of land economics, and this is particularly so when a deductive model of the city is desired excluding those cultural and social influences which the ecologist eschewed. When Quinn writes 'Ecological interaction underlies many aspects of community life. Merchants who want strategic commercial sites at the heart of the city compete for the limited supply of land in this location',³⁵ and then goes on to argue that urban residents 'bid for the limited supply of residential space', one is forced to conclude that 'sub-social' is merely another term for 'economic' for he is making a straightforward statement which is almost a definition of economics—the allocation of scarce resources to alternative ends. It follows that the vigorous attempts to present a theory of urban land use have passed to the land economists and that the stream of work started by Burgess while still of value in its empirical side has not been a source of rich theoretical construction.
- 2 The clear rejection by the classical human ecologists of social and cultural influences while making for simplicity in terms of economic theory, has led to severe criticisms in the inductive sphere for, as the economic implications of competition became apparent, it was only to be expected that protest would arise against these mechanistic theorems.

Two such protests can be noted

- (i) *Sentiment and symbolism as ecological variables* In a paper with this title Walter Firey³⁶ called attention to the difficulty outlined in the last paragraph—'A different order of concepts, corresponding to the valuative, meaningful aspect of spatial adaptation, must supplement the prevailing economic concepts of ecology.' Firey made his objection to the classical position on two grounds arguing that there were two kinds of human adaptation to the urban environment. The first he called 'volitional adaptation' since 'values which express primarily

³⁴ G. A. Theodorson (1961) *Studies in human ecology* 3 (New York)

³⁵ J. A. Quinn (1939) The nature of human ecology: re-examination and re-definition *Soc Forces* 18, 166

³⁶ W. Firey (1945) *Sentiment and symbolism as ecological variables* *Am Sociol Rev* 10, 140

contribution to theory. One is thus led via a long road back to the destructive critics and the views of Gittus. 'The former theories and techniques of urban analysis have lost much of their validity. There is need for new emphasis on the variability of urban structure and this involves the need for an empirical rather than a theoretical approach to the situation. It is conceivable that [it] might fail, but in view of the impasse that has now been reached in this field from the starting point of general theory, it is well worth the making.'⁴³

2 LAND ECONOMICS AND URBAN LAND-USE

The earliest work of importance in this field pre-dates that of the human ecologists by many years for Richard M. Hurd's *Principles of city land values* appeared in its first edition in 1903.⁴⁴ Much of this enquiry, as the title of Hurd's book implies, is directly concerned with land value, but even so it is inextricably bound up with land use for 'the patterns of land uses and land values will be mutually determining'.⁴⁵ Hurd drew upon earlier work concerned with land value and adapted the principles of Ricardo, propounded for agricultural land, to an urban setting. Thus he began from the principle that value in urban land, as in agricultural land, is the resultant of economic or ground rent capitalized.⁴⁶ Further 'in cities economic rent is based on superiority of location only, the sole function of city land being to furnish an area on which to erect buildings'.⁴⁷ With the growth of a city more remote, and hence by definition inferior, locations are brought into use so that rents at the most accessible points rise. For this accessible and consequently more valuable land competition will take place, 'any utility may compete for any location within a city and all land goes to the highest bidder'—who therefore obtains maximum convenience or economy in time and effort by being most accessible. Hurd summed up his argument in a succinct sentence, 'Since value depends on economic rent and rent on location, and location on convenience, and convenience on nearness, we may eliminate the intermediate steps and say that value depends on nearness'.⁴⁸ But Hurd notes that 'nearness' is a relative term and has to be evaluated in terms of the growth and physical structure of the city on the one hand and the nature of the use required on the other. He concludes by emphasizing the necessary limitations imposed by an economic

⁴³ E. Gittus (1964) 13

⁴⁴ R. M. Hurd (1924) *Principles of city land values* (New York)

⁴⁵ W. Alonso (1964) *Location and land use* 16 (Cambridge Mass.)

⁴⁶ R. M. Hurd (1924), 1

⁴⁷ R. M. Hurd (1924)

⁴⁸ R. M. Hurd (1924) 13

besides the more rigorous theoretical constructs of the thorough-going economist, whilst its rejection of cultural and social influences has hampered a vital line of enquiry. More recently the main trend has been to enumerate the variables which influence land-use in order to define an 'ecological complex'. These in themselves have become more elaborate, although generally in agreement. The framework outlined by Schnore⁴⁰ can be set alongside an earlier one by Beverly Duncan⁴¹

<i>L. Schnore</i>		<i>B. Duncan</i>
<i>Environment</i>	Topography	<i>Site</i>
<i>Technology</i>	Transport and communication	<i>Accessibility</i>
	The friction of space	
<i>Population</i>	Size	<i>Growth</i>
	Rate of growth	
	Ethnic and racial composition	
<i>Organization</i>	Economic base	<i>Persistence</i>
	Community (ecological)	
	Organization	
	(The extent to which an urban area is occupied by more or less isolated and self-contained sub-systems)	
	Social class composition	

Duncan's 'persistence' referred mainly to historical factors and is not equated with Schnore's 'organization' which is particularly important since he maintains that 'all of the broad factors listed above—environment, technology and population—affect the internal arrangement of the city by their joint effects upon organization. In short, all of the other variables in the 'ecological complex' operate to affect spatial distribution by being mediated through functional organization'.⁴² Schnore deliberately excludes 'value systems' (i.e. sentiment and symbolism) and 'institutional arrangements' (i.e. public policies) from his complex.

This is a list to which, with the exclusion noted, few people would take exception, but it does little more than abstract and enumerate the sorts of factors which the oldest studies in land-use drew upon in explanation of unique or exceptional situations. It seems to make little

⁴⁰ L. F. Schnore (1965), 383-6.

⁴¹ B. Duncan (1964) *Variables in urban morphology*, in E. W. Burgess and D. J. Bogue editors (1964) *Contributions to urban sociology*, 17 (Chicago).

⁴² L. F. Schnore (1965), 383.

can be used in the derivation of a city structure closely analogous to that proposed by Burgess. In figure 9-6 distance is used as a measure of 'convenience' in the sense used by Ratchiff. Each crude and broad category of land user can be examined by ability to pay rent against

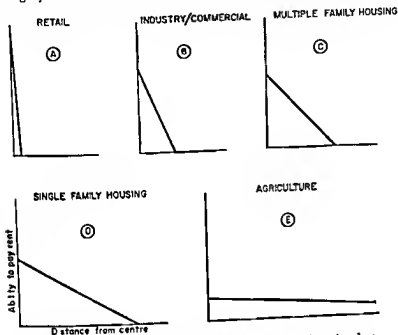


Figure 9-6 Bid rents for different users of urban land in relation to distance from the city centre. After B. J. L. Berry (1959). In each of these graphs the ability of a potential user of urban land to pay rent is plotted against distance from the city centre.

distance from a single, most accessible core.⁵⁵ Retail uses demand greatest accessibility to the whole city population in order to maximize profits, while away from the city centre this quality falls off very rapidly as does the willingness to pay high rents (figure 9-6A). Offices such as those of legal or insurance firms or of doctors and dentists also require accessibility and a central location but the very nature of their businesses means that the very high rents of the centre can be avoided by

⁵⁵ For a discussion see B. J. L. Berry, (1959) *The spatial organization of business land uses* chapter 3 in Garrison *et al. Studies of highway development and geographic change* 62 (Seattle).

investigation which does not take into account 'individual and collective taste and preference as shown in social habits and custom' ⁴⁹

These ideas have remained as basic to the mainstream of land economics. The major restatement took place in the 1920s by Robert M. Haig⁵⁰ but in much the same terms. Haig saw rent as the charge for accessibility or the saving in transport costs and invoked a bidding process to determine the occupancy and use of land. Undoubtedly his major contribution was the introduction of the notion of the 'friction of space', that is, that hindrance to perfect or immediate accessibility, for without such 'friction' there would be no transport costs and all locations would be perfect. The purpose of transport is to overcome this imperfection or friction, but while transport partly offsets friction, site rentals and transport costs represent the charge for that friction which remains. Rent thus appears as a payment for the saving in the costs of transport and these, rent and transport costs, will vary with site since the theoretically perfect site for the activity is that which furnishes the desired degree of accessibility at the lowest cost of friction⁵¹ so that the layout of the metropolis tends to be determined by a principle which may be termed minimizing the costs of friction⁵². This involves a three way relation of rent, transport costs and location which are interdependent. Ratchiff, in his well known volume *Urban land economics* adopts an argument that is basically similar. 'The utilization of land is ultimately determined by the relative efficiencies of various uses in various locations. Efficiency in use is measured by rent-paying ability the ability of a use to extract economic utility from a site. The process of adjustment in city structure to a most efficient land use pattern is through the competition of uses for various locations. The use that can extract the greatest return from a given site will be the successful bidder' ⁵³. From this there emerges an 'orderly pattern of land use spatially organized to perform most efficiently the economic functions that characterize urban life' ⁵⁴. Ratchiff follows further enquiry into the competition of users for sites by the bidding process and into the minimizing of costs of friction, by an analysis of the different demands each user will have in locational terms, for not all users are in direct competition. Nevertheless 'in summary one might say that the structure of the city is determined through the dollar evaluation of the importance of convenience' ⁵⁴. This sort of argument

⁴⁹ R. M. Hurd (1924) 18

⁵⁰ R. M. Haig (1926) *Toward an understanding of the metropolis* *Q. J. Econ.* 40, 421

⁵¹ R. M. Haig (1926)

⁵² R. V. Ratchiff (1949) *Urban land economics*, 369 (New York)

⁵³ R. V. Ratchiff (1949) 369 ⁵⁴ R. V. Ratchiff (1949), 375

nearer to the core and consequently that type of use will succeed. If this is converted into a two dimensional diagram then a series of rings will be generated and a cross section interpreted in terms of value will give a close approximation to that presented for Topeka by Duane

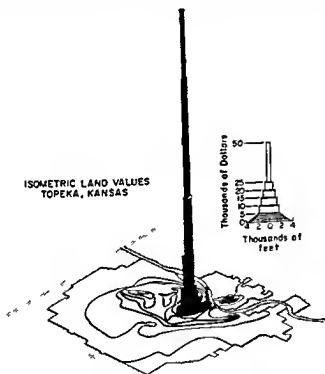


Figure 9-8. The distribution of land values in Topeka
After D. Knos (1962)

Knos⁵⁶ (figure 9-8) There are a large number of assumptions which are not proven and a number of serious flaws in the argument which has been presented. For example, all users are assumed to require equal quantities of land and no allowance is made for possible substitution of a larger land area for a less convenient location or, in crude terms,

⁵⁶ D. Knos (1962) *Distribution of land values in Topeka* (Lawrence, Kansas)

marginal locations. The slope for rent/distance is, therefore, less steep (figure 9.6B). Multiple housing schemes, such as apartment blocks, will give larger returns per unit area and can, therefore, obtain a greater degree of accessibility than single family housing but will not need the central locations which the retail and commercial offices have to obtain (figure 9.6D). The advantages of accessibility are, therefore,

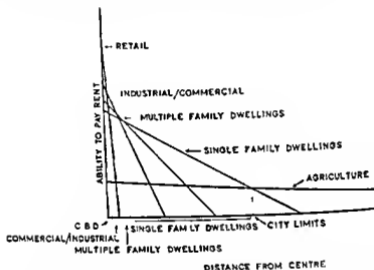


Figure 9-7. Superimposition of separate graphs in figure 9.6 indicates that the various lines intersect. At each intersection from the city outskirts in towards the centre the inner use can afford to pay higher rents and takes over from the outer use. These points are indicated by the dotted lines.

sacrificed in the interest of lower costs, although it must be emphasized that to these costs in terms of land must be added the costs of travel for, as has been emphasized, value or the capitalized expectation of rent, transport costs and location are interdependent. Finally agricultural uses are the least intensive and although they, too, would derive advantages from location at the centre they are outbid by all the urban uses and the rent/distance slope is the least steep (figure 9.6E).

If all these relationships, that is, all the slopes, are now superimposed (figure 9-7) then it can be seen that where the slopes intersect then the user furthest away from the core will be outbidding the user

nearer to the core and consequently that type of use will succeed. If this is converted into a two dimensional diagram then a series of rings will be generated and a cross section interpreted in terms of value will give a close approximation to that presented for Topeka by Duane

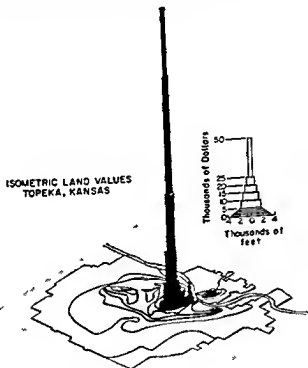


Figure 9-8: The distribution of land values in Topeka
After D. Knos (1962).

Knos⁵⁸ (figure 9-8). There are a large number of assumptions which are not proven and a number of serious flaws in the argument which has been presented. For example, all users are assumed to require equal quantities of land and no allowance is made for possible substitution of a larger land area for a less convenient location or, in crude terms,

⁵⁸ D. Knos (1962): *Distribution of Land values in Topeka* (Lawrence, Kansas)

for buying cheaper land further out. Several attempts have been made to provide a more sophisticated basis and a more complex model in place of the simple concepts so far considered.⁵⁷

The initial outline of one of these models can be briefly considered in order to indicate its rationale rather than trace its full development which is impossible in the present limited context. William Alonso in his work *Location and land use* introduced two further variables, first the quantity of land which each user will wish to acquire and second the amount of disposable income which will be devoted to land and travel costs on the one hand, and all goods and services, including savings on the other. The equilibrium of the individual household in the urban situation is then seen as a consequence of the relation of all the alternatives in expenditure open to the individual and the patterns of preference which can be exercised. The alternatives open define the 'locus of opportunities' which is seen as a surface generated by the interrelation of the three variables noted above, the amount of land, the amount of goods and services and distance from the centre. To relate this back to figure 9.6, it will be observed that the ability to pay rent depends partly on the size of the land area required and partly on the desired expenditure on other things. A complex surface is generated since the relations are not simply linear. Thus if the amount of goods and services is held constant and the relationship between quantity of land and distance considered then 'the price of land' decreases with increasing distance from the centre. Therefore, the quantity of land that may be bought increases with the distance, since land is becoming cheaper. On the other hand, distance enters in the form of commuting costs. As distance increases, so do commuting costs and consequently the amount of land that may be purchased decreases. The resultant curve of quantity against distance 'rises to the point at which marginal increases in commuting costs are equal to the savings realized from the decreasing price of land. Thereafter, the amount of land that may be bought with increasing distance decreases'.⁵⁸ The locus of opportunities surface defined along the three axes—of quantity of land against distance, quantity of land against quantity of goods and services and quantity of goods and services against distance—is set against the pattern of preferences defined as a surface from the possibility of substitution amongst the three variables so that the individual household would be equally satisfied by different combinations of land, goods and accessibility (distance). From this the equilibrium of the household is derived, the desires in terms of preferences being linked to the possibilities in terms of the locus of opportunities. This

⁵⁷ W. Alonso (1954), L. Wingo (1961) *Transportation and urban land* (Washington)

⁵⁸ Alonso (1954) 23

individual equilibrium solution is then reformulated in the terms of market equilibrium, but this is a complex process for land and distance are so intertwined that the individual demand curves cannot be amalgamated into a demand curve for the market.

It will be apparent that this model is working as the sub-title of the volume states, 'towards a general theory of land rent'. The assumptions on which the model is built are clearly set out. These include a featureless plain, all land of equal quality, all land ready for use without improvement, land freely bought and sold with both buyers and sellers having perfect knowledge of the market, no legal or planning restraints, no social restraints, sellers who wish to maximize revenue and buyers their profits or satisfaction, and the city regarded as a two-dimensional unit with no vertical element. The result is a deductive argument with clear premises explicitly rejecting all but purely measurable economic factors. It is rigorous, internally consistent and far removed from the reality of the city as it comes closer to pure economic theory.

3 ACTIVITY SYSTEMS AND URBAN LAND-USE

The discussion so far has revealed that work on the structure of towns in human ecology has reached an impasse while economic models contribute but partially to the solution of the problem. There is a third approach which while presenting no model seems to provide a stimulating way of looking at urban land use structure and leads to a coherent framework for interpreting it. This is the approach via activity systems which can be defined as 'behaviour patterns of individuals, institutions and firms which occur in spatial patterns'.⁵⁹ F. Stuart Chapin has attempted to sketch 'a conceptual framework to describe some of the major elements and dynamics of human behaviour as they relate to land use'.⁶⁰ Figure 9.9 indicates the sequence which Chapin invokes to provide a framework consisting of values, behaviour patterns and outcomes. 'Certain individual or group-held values concerning the use of a particular parcel or area set in motion a four phase cycle of behaviour which culminates in the parcel or area being put to a particular use'.⁶¹ These phases are part of the 'cycle of human behaviour' or of the behavioural pattern indicated above and are classified as experiencing needs and wants, defining goals, planning alternatives, deciding and acting. Because of his particular interest, Chapin puts this in the context of planning but it will be seen that he accepts explicitly the views of Firey in stating

⁵⁹ F. S. Chapin (1965) *Urban land use planning* 244 (Urbana, Ill.)

⁶⁰ F. S. Chapin (1965) 29

⁶¹ F. S. Chapin (1965) 30

with culturally determined values which find no place in any other construct. From these values, both conscious and subconscious, or

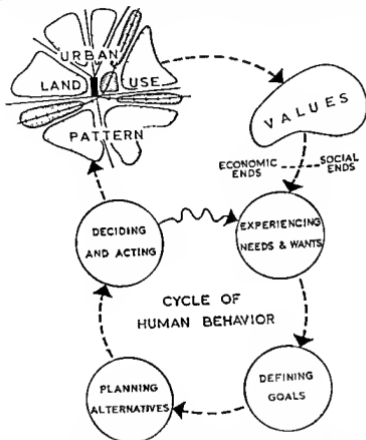


Figure 9-9 The sequence of action and the influence of values in bringing about a change in the urban land use pattern. After F S Chapin Jr (1965)

explicit or implicit, of individuals or groups of individuals, patterns of behaviour are generated leading to those actions in the urban setting which are the determinants of the land use pattern. The behaviour patterns can be interpreted as constituting systems of activity and thus

is as equally applicable to the firm or the individual. Rannells has classified these activities into three states of elaboration.⁶²

- 1 Routine activities Standard patterns of movement of the individual, for example the journey to shop
- 2 Institutionalized activities These are concentrated onto particular points by institutions, as for example, onto a theatre which necessarily focuses a number of individual systems upon it
- 3 Organization of processes This is the most complex situation where there is a whole series of patterned cross relationships. For example the 'activity system' of a bank by the very nature of its business will be made up of a wide array of associated but different links

The word 'link' used above indicates that the study of these systems leads directly into the examination of linkages, for few 'establishments', or indeed individuals, are isolated for they are associated with others by a series of linkages, where a linkage is defined as 'a relationship between establishments characterized by recurrent interactions which require movement of persons or of goods or the exchange of information'.⁶³ Thus, for example, the emergence of a well defined legal area in a city can be seen as a consequence of a system of activities and linkages which bind legal firms together. There is a relation to the general public demanding accessibility in the sense which it has previously been used in this chapter, there is a relation to the law courts, the location of which may be due to essentially historical circumstances, there is a relation to standard sources of information such as a registry of wills and of births, marriages and deaths, there is a relation of firm to firm in negotiation which involves face to face situations, there is a relation in Britain of solicitor to barrister. For any such area these links can be traced, indeed they could to an extent be measured and quantified. The result is a land use element which can be seen as the product of a complex of linkages which are the creation of the activity systems of the various components. The tracing of the systems and the identification of the linkages is a prerequisite to the understanding of the components or the pattern of land use.

It is perhaps worthy of note that the sort of model proposed by the economists attempts to do just this by ignoring all the complexity and identifying one link only—that with the centre of the city. It follows that this approach is extremely broad in one context in that the values behaviour-patterns framework permits the introduction of the widest range of operative factors for there are no limiting assumptions and no deductive arguments. Indeed the 'activity system' concept is much

⁶² J. Rannells (1956) *The core of the city* (New York)

⁶³ J. Rannells (1956)

nearer the ecological framework presented by Schnore. At the same time it is very restricted in that instead of generalizing from the aggregate condition, it attempts to examine the real city in microdetail—for example in the actual movements of individuals—and from this to build up to an explanation of larger segments. In this way it presents a different method of looking at the city, for while maintaining contact with reality it still identifies the framework of forces which shape the aggregate, the total structure.

An attempt has been made in this chapter to survey in general terms those studies which attempt either to construct a model of the entire city or to introduce a conceptual framework in relation to which it can be understood. It is apparent that generalization on such a vastly complex topic must inevitably be unreal—hence the flight away from classical ecology either to the discipline of theoretical economics or the rationality of an approach via the detail of individual or corporate activities. It would seem that in these two directions useful contributions may be found, either in the clear delineation of assumptions and the erection of a rigorous model which can only examine the interaction of highly selected variables, thereby illuminating brightly a small part of the whole picture, or in the construction of a meaningful conceptual framework which might indicate significant bases from which to interpret the complexity of land uses.

Notes on further reading

The most important material is that referred to in the footnotes to this chapter and these standard works should be consulted. The most useful general volumes on activity systems: urban land economics and human ecology are respectively

CHAPIN, F. S. (1965) *Urban land use planning* (see footnote 59). This deals with a larger range of topics and is accessible and straight forward.

RATCLIFF, R. V. (1949) *Urban land economics* (New York). This is still the most rewarding general volume to consult.

THEODORSON, G. A. editor (1961) *Studies in human ecology* (New York).

A good number of books on urban economics have been published recently as the specialism becomes more popular in relation to the universal relevance of urban problems. Among them are

EVANS, A. W. (1973) *The economics of residential location* (London).

GOODALL, B. (1972) *The economics of urban areas* (Oxford).

PERLOFF, H. S. and WINGO, T. JR. editor (1968) *Issues in urban economics* (Baltimore).

RASMUSSEN, D W (1973) *Urban economics* (New York) (1974) *The modern city readings in urban economics* (New York)

The following should also be considered

ALONSO, W (1964) *Location and land use* (see footnote 45)
 WINGO, L (1961) *Transportation and urban land* (see footnote 57)
 HARVEY, D (1973) *Social justice and the city* Chapter 5

There are two areas of investigation which have not been introduced into this chapter but which need to be reviewed. The first of these concerns the relationship of population densities to distance from the city centre. Here the main works are

BERRY, B J L, SIMMONS, J W and TENNANT R J (1963) Urban population densities structure and change *Geog Rev* 53, 389
 CLARK, C. (1951) Urban population densities. *J Roy Stat Soc* A64, 490
 NEWLING, B E (1969) The spatial variation of urban population densities *Geog Rev*, 59, 242

A useful review can be found in

BERRY, B J L and HORTON, F E (1970) *Geographic perspectives on urban systems* chapter 9 The urban envelope patterns and dynamics of population density (Englewood Cliffs, N J)

The second concerns the development of models of urban growth. Two general introductions are to be found in

PERLOFF, H S and WINGO, L JR, editors (1968) *Issues in urban economics Part II Intrametropolitan development*, particularly the chapter by Britton Harris Quantitative models of urban development (Baltimore)
 KILBRIDGE, M D, O'BLOCK, R P and REPLITZ, P V (1970) *Urban analysis* Div of Research Grad School of Business Admin Harvard (Boston)
 This contains an extensive bibliography

A further general source which includes not only papers but a series of useful reviews is *J Am Inst Planners* (1965) 31 (2) Special Issue Urban development models. While a widely quoted study is

LOWRY, I S (1964) *A model of a metropolis* (Santa Monica) Rand Corp Memo RM-4035-RC

Further reading on characteristic areas within the city is included at the end of succeeding chapters but a very convenient collection of readings is

BOLRNE, L S (1971) *Internal structure of the city* (New York)

10 THE CENTRAL BUSINESS DISTRICT

Insofar as the central business district (CBD) is regarded as the organizing centre about which the rest of the city is structured, it is appropriate that the concept be isolated for special consideration, it identifies one of the 'typical' areas of the city. Investigators have tended to approach the CBD in three ways. First by attempting to provide the idea with a clear spatial identity through seeking means of defining its limits objectively. Inevitably such attempts at definition lead into consideration of the many specialized sub-units which make up the composite notion of a CBD. The second line of investigation has been by considering the composing elements in isolation, that is by considering locational requirements, say of department stores, quite independently of the existence or character of a CBD as such. The third approach has been by way of generalizing these individual locational requirements in terms of activity systems and linkages. These three approaches are by no means clearly distinctive and each must of necessity involve elements of the others, but in the order in which they have been placed here they can be looked upon as representing a process of growing incisiveness and insight as the emphasis swings from a conventional aggregate land-use basis towards the consideration of the multiplicity of decision making situations through which the CBD is built up.

1 CRITERIA FOR AREAL DEFINITION

The earliest concern with the CBD was related to the traditional geographical problem of areal definition, the notion of such a region having been derived from the ecologists' model of the city. The terms 'retail core' or CBD or other equivalents had long been in use, but the procedures employed in definitions were extremely crude and depended on visual inspection of land use maps in the search for discontinuities between retail and other specified central uses and non-central uses, and upon local opinion as to what constituted the shopping or 'downtown' area. Perhaps significant geographical work was not attracted to this problem because the challenge of a process of change was not always apparent. Indeed the very idea that the CBD was surrounded by a 'zone of transition' implied that it was itself immutable. This was

confirmed by an apparent lack of areal extension, accompanied by the failure to materialize in this context of the invasion-succession syndrome of the classical ecologists. For a variety of reasons—the role of vertical as opposed to horizontal development and the growth of suburban shopping centres among them—the CBD has not extended rapidly in area terms over the last forty years and process, therefore, has not been as clearly apparent as in the vast extension of residential areas. The result was an odd lack of concentrated analysis of the CBD in geographical literature and it was not until 1954 that R. E. Murphy and J. E. Vance Jr¹ by their work set in motion a series of studies concerned directly with this important part of the city.

Murphy and Vance were primarily concerned with the problem of definition, with the attempt to provide a uniform method for the physical delimitation of the CBD which could replace the fixing of boundaries by haphazard and local procedures. Accepting the view that any boundary must be zonal (and impermanent), they sought to 'draw a line which would approximate this zonal edge'. Undoubtedly the major problem in this exercise resides in the most appropriate criteria to be used. A number of these can be reviewed and since it has been argued in the previous chapter that use is, in general terms, the determiner of the value which can be put on land, and vice versa in a given situation, then it would seem that the most effective tool for definition would reside in land value or some derivative.

(i) *Appraised or assessed land values* It is implicit in many studies, such as that of Topeka, for example, reproduced in the last chapter (figure 9-8), that land values, reduced to some comparable unit of area or of street frontage, would be powerful indicators of the CBD at whose margins values should fall rapidly. But there are many difficulties that arise in the attempt to employ this apparently ideal basis. In Britain, as in most parts of the world, the simple and outstanding one is that reliable data are just not available. In the report of the proceedings of a colloquium under the Acton Trust on 'Land values' published in 1965, 'there was general agreement that lack of reliable data was a serious handicap to understanding' and again, 'because of lack of data many details could not be studied at present'.² A contributor to the volume who was presenting an isopleth map of land values (figure 10-1) wrote 'I have chosen to enclose the residential part of the Barbican

¹ R. E. Murphy and J. E. Vance, Jr (1954a) Delimiting the CBD *Econ Geogr* 30, 189-222 (1954b) A comparative study of nine central business districts *Econ Geogr* 30, 301-36

² P. Hall, editor (1965) *Land values*, 17 (London)

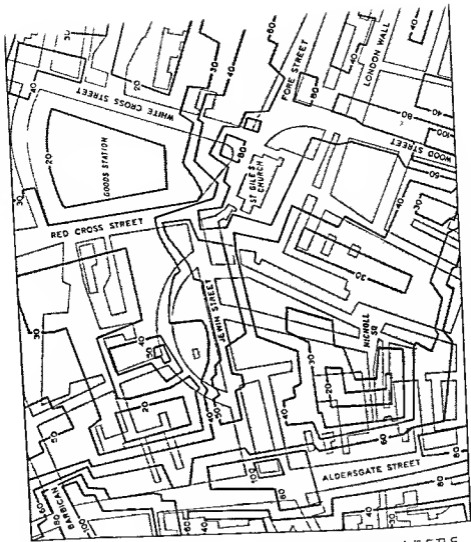


Figure 10-1: Isopleths of land values in the Old Barbican area of London After B Anstey in *P Hall* (1965) This is part of a map which was drawn in 1953 The values are expressed in terms of pounds sterling per foot frontage This is a sample map of isovals — that is lines joining points of equal value — and an interpretation will be found in the source referred to in the text

area with a land value contour of £4 per foot super, or say £175,000 per acre. The process by which I arrive at this figure is long and complicated and largely infra conscious but I am sure it is just about right! The best valuations are usually made at this level—some valuers would describe it as "according to the stomach". This is because one gets a sinking feeling when it is wrong.³ Clearly at this level there is no way at all to precision in definition. Murphy and Vance discuss this problem in some detail, considering both appraised values, that is the values approximating to a market value, and assessed values, which are used for taxation purposes. Their main criticisms are the differences between cities so that comparisons are impossible, the subjectivity of many of the assessments, the occasional lack of data because of confidentiality, the fact that values are unrelated to building height and, largely, that they do not directly reflect use. Whilst accepting the operational problems, it is difficult to sustain the last two more fundamental objections. Value should reflect demand for a scarce commodity and building high is an attempt to squeeze maximum use out of a limited resource, that is central city land, and therefore, *a priori*, there should be a clear relation between value and height. There is a whole range of other influences at work in the development of the skyscraper⁴ but essentially it is related to excessive demand for limited space. There is some truth in the view that the skyscraper is merely a three dimensional variant of the grid iron street plan made to stand up vertically instead of horizontally.⁵ Building high increases floor space on valuable sites hence it is impossible to maintain that a height of building/land value relationship does not exist. Likewise if it is maintained that land value does not discriminate between uses, then this presents a fundamental challenge to the view of the land economist as outlined in the previous chapter, except in so far as, related to their needs and resources, two potential users make equal bids. It is maintained, therefore, that, through the crucial measure of value, the nature of the CBD boundary can be examined and the extent of its zonal or abrupt character evaluated. But one is forced to conclude that the problems concerning land values are associated with the impossibility of obtaining satisfactory, uniform, objective data for a large number of cities, rather than with the concept of using values themselves.

³ P. Hall, editor (1965), chapter 2. A study of certain changes in land values in the London area in the period 1950-64 (by B. Anstey).

⁴ J. Gottmann and R. A. Harper, editors (1967). The skyscraper amid the sprawl. Part IV of *Metropolis on the move*, 125-50 (London).

⁵ J. Gottmann and R. A. Harper, editors (1967), 133. Gottman quotes this view from John A. Kouwenhoven.

(ii) *Rent* If land values are not easily obtained then clearly rent per unit area or street frontage is a good substitute since the relation is clear, as indicated in the last chapter, land value is rent capitalized. This criterion of rent was used by William-Olsson in an effective study of the shopping streets of Stockholm though no attempt was made to delimit an area by a critical value.⁶ A shop rent index was derived by dividing the total rents for any premises by the frontage. But here, too, the same difficulties arise, for although rent is a fixed sum and less nebulous than appraised value, the data are generally not available and are treated as confidential. On detailed scrutiny a good proportion of William-Olsson's figures are seen to be estimates and to some extent the objectivity of the maps is superficial rather than fundamental.

(iii) *Rateable values* In Britain this value is used as a basis for the fixing of contributions towards local finances. It is easily available for all properties and can be taken as a substitute for rent. The method of rating is fixed by the Rating and Valuation Act of 1925 modified by the Rating and Valuation Miscellaneous Provisions Act of 1955.⁷ By this the gross rateable value is defined as 'the rent at which the hereditament might reasonably be expected to be let from year to year, if the tenant undertook to pay all the usual tenant's rates and taxes, and if the landlord undertook to bear the cost of repairs and other expenses, if any, necessary to maintain the hereditament in a state to maintain that rent'.⁸ Here, then is an easily available figure which is at least indirectly linked to land value, indirectly since the rateable value is assessed as the rent of a building not simply of the urban land, so that other complexities are introduced. In making this assessment two main factors are considered. The first is the physical condition, including space, nature of frontage and access, the second is site advantages, a less tangible factor which includes the potential value of the site based on experience and on current rents which are known to the assessor. In special cases the valuation officer can demand the turnover figures of a business. These rateable values have been used frequently in British work, perhaps most consistently by D. T. Herbert who in 1961 proposed a rate index⁹

$$RI = \frac{\text{Gross rateable value}}{\text{Ground floor space}}$$

⁶ W. William-Olsson (1960) *Stockholm structure and development*, *International geographical congress, Norden*, 63-5.

⁷ D. M. Lawrance and W. H. Rees (1956) *Modern methods of valuation*, fourth edition, 264-83 (London).

⁸ D. M. Lawrance and W. H. Rees (1956), 266.

⁹ D. T. Herbert (1961) *An approach to the study of the town as central place* *Sociol. Rev.* 9, 273-92.

This index was to be used to identify, 'a part of the town which without attempting to define it too closely, might be termed the core of the central business district'¹⁰ (figure 10-2) there is deliberately no attempt to put forward a method of delimitation. The crux of the problem lies in the selection of a value which must be an arbitrary process unless isopleths can be drawn and some form of gradient analysis introduced. Undoubtedly these figures will continue to be used in Britain and they do provide a most useful basis for investigations of city structure. Two qualifications are needed. These are assessed figures and no more than the view of the valuation officer and though he works from experience and extensive evidence and though by the process of objection each decision can be subject to scrutiny nevertheless the value is still at root a personal assessment and is in danger of being given a specious objectivity by appearing in numerical form in an official source. The second qualification is to repeat that the value is an assessment of land plus building and not of the land alone.

Apart from these criteria for delimitation which are in some way related to land value there is a series of other bases which have been suggested from time to time. Among these are population densities¹¹ pedestrian flows and even retail turnover.¹² All are faced with the same problem of availability of data on a sufficiently detailed scale to be usable. The result is that most investigators turn quite properly to the land uses themselves as the simplest most direct evidence to be utilized in determining the spatial characteristics of the CBD.

2 METHODS OF AREAL DEFINITION

The inadequacy of simple inspection methods for delimiting the CBD has already been noted whilst the attempt to identify characteristic edge uses although interesting cannot be applied in detail. Murphy and Vance were therefore forced to elaborate a standard procedure. Thus they did as follows:

- (i) *Definition of uses to be accepted as characteristic of the CBD* Such uses were isolated in a negative way by elaborating non-central uses as permanent residence, government and public buildings, organizational

¹⁰ D. T. Herbert (1961) 280.

¹¹ R. E. Murphy (1966) *The American city* 286-90 (New York).

¹² L. H. Russwurm (1964) The central business district retail sales mix. *Ann Assoc. Am. Geogr.* 54, 524-36.

For examples of a variety of methods see W. F. Heunemeyer, M. Van Hulten and Hans D. de Vries Reilingh, editors (1967) *Urban core and inner city* (Leiden). See particularly parts II and III.

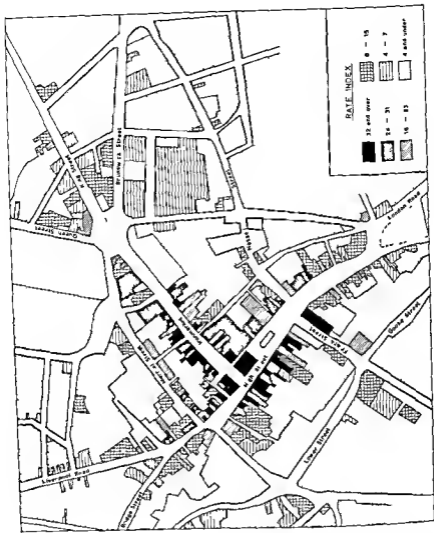


Figure 10-2: The distribution of rate indexes in Newcastle - under - Lyme After *D. T. Herbert (1961)*
The calculation of the rate index is given in the text

establishments (churches, colleges etc), industrial establishments (except newspapers), wholesaling, commercial storage vacant lots and buildings. This is a list which can be accepted though at this crude level of generalization most of the real problems of assignment of uses to or not to the CBD do not appear. But the essential point is that the decision made at the outset is crucial and subjective: the eventual area defined depends upon these bases put forward in a list of excluded uses. It is both interesting and amusing to include here a definition of a central use by John Allpass and his colleagues at the Institute of Centre planning at Copenhagen: 'A CBD function: A function which has not yet left the central business district'.¹² This clearly underlines the circularity of the reasoning by which the central uses are isolated.

(ii) *Measurement of floor space devoted to the various uses* Having identified central uses, then from the detailed land use map which is made for all floors to include total use: not merely the ground floor: the amount of floor space devoted to each use category is calculated. The unit for this process is the city block which is an obvious basis in the American city with its well nigh universal grid pattern: but which is not so clear-cut in European cities where intricate and irregular plans make blocks much less amenable units.

(iii) *Calculation of ratios* For each of the blocks a series of ratios or indices can be calculated. These are:

1 *Total height index (HI)*

$$HI = \frac{\text{Total floor space}}{\text{Ground floor space}}$$

This is the height of each block in floors if all the space, whatever its use, were to be spread evenly over the whole block. This is not the most valuable of measures for it merely generalizes a direct mapping of building heights. By reducing these heights to a block basis it provides a stage in the generalizing of actuality to a line boundary.

2 *Central business height index (CBHI)*

$$CBHI = \frac{\text{Total CB uses floor space}}{\text{Ground floor space}}$$

This is the height of each block in floors if all the central business uses were evenly spread over the whole block. It is a more useful

¹² J. Allpass *et alia* (1967) *Urban centres and changes in the centre structure* in W. F. Heineken *et alia* (1967) 103.

measure since a CBHI of 1 indicates a complete ground floor coverage by central business uses. However, while showing the importance of central business uses, it does not indicate dominance for it fails to show the proportion of total available space in central uses.

3 Central business intensity index (CBII)

$$CBII = \frac{\text{Central business floor space}}{\text{total floor space}} \times \frac{100}{1}$$

This measures the proportion (percentage) of all available floor space in central business uses and is by far the most useful of the ratios, for it indicates the relative dominance of central business uses in any block and the choice of some limiting value (say 50 per cent) can be used as a universal in delimitation.

4 Central business index (CBI)

$$CBI = \text{CBHI of 1 plus CBII of 50 per cent}$$

To define the CBD Murphy and Vance took a composite measure as indicated above and called it the CBI. All blocks meeting the requirement were regarded as part of the CBD.

(iv) *Application of ratios or indices* The application of these indices requires a set of further rules as, for example, that a non CB block surrounded by CB blocks should be included within the CBD boundary. The application of these techniques in the definition of the CBD of Worcester, Mass., is shown in figure 10-3.

(v) *Remaining problems* Even after this set of rules has been applied some clear objections remain.

- 1 Variations in block size are not taken into account and could have a marked influence on the location of a boundary in detail. This becomes especially relevant in comparative studies and the whole purpose of this procedure is presumably to establish a basis for comparison.
- 2 The central business uses are subjectively determined even if they are uniformly applied. This repeats an earlier comment.
- 3 No account is taken of the 'quality' of use of an area. A small corner shop and a specialized and expensive central store are classed the same and the floor space used could be the same.



Figure 10-3: The definition of the central business district Worcester Mass After R Murphy and J E Vance Jr (1954a see footnote 1 p 205) **1** Central business height index (CBHI) of 1 or more **2** Central business intensity index (CBI) of 50 or more **3** CBHI of 1 or more and CBI of 50 or more **4** CBD boundary **5** Peak land value intersection

- 4 Even if the operational difficulties are overcome the main objection to the method is still outstanding. What is the whole point and purpose of defining such a boundary?

The earliest modifications, whilst still dominated by the delimitation problem, were directed towards the fact that the CBD so defined has a 'hard core'—'where the definitive qualities reach their greatest intensity'¹⁴ Hence there were attempts to separate 'core' from the 'frame' in which it was held.¹⁵ Perhaps the most intensive of these was the study of central Cape Town by D. H. Davies.¹⁶ Beginning with the principle that 'in the heart of the CBD more intensive use of space, higher land values, heavier pedestrian traffic and generally taller buildings indicate the presence of a "hard core"', Davies went on to outline procedures for the identification of this area. As one would anticipate, these were based on a revision upwards at the two points where major arbitrary decisions were made by Murphy and Vance. First the necessary minima for the CBI were increased to a CBHI of 4 and a CBII of 80 per cent. Second the marginal areas which constitute the frame were further diminished in the CBD context by restricting those uses regarded as 'central'. Cinemas, hotels, head offices, newspaper establishments, government and municipal offices and retail stores offering low quality goods (subjectively defined) were regarded as non CBD hard core uses. This process is a neat illustration of the sorts of decisions made at various points in the defining procedure—why a CBII of 80 per cent? The eventual delimitation of these areas in Cape Town is indicated in figure 10-4, where the exclusions resulting from the application of these more rigorous conditions are depicted.

3 PURPOSE OF DEFINITION

At this stage it is as well to turn aside to review the purpose behind this type of analysis for it would seem that the first approach by geographers to the study of the CBD was dominated by the search for definition. From definition there are advantages to be gained. If some universal method were to be adopted, then the size, structure and nature of these areas could be considered in relation to rank in the urban hierarchy, and an important function/form link could be

¹⁴ R. E. Murphy, J. E. Vance, Jr., and B. J. Epstein (1955) Internal structure of the CBD *Econ Geog.* 31, 21-46.

¹⁵ E. M. Horwood and R. R. Boyce (1959) *Studies of the central business district and urban freeway development* (Seattle).

¹⁶ D. H. Davies (1965) *Land use in central Cape Town: a study in urban geography* (Cape Town).

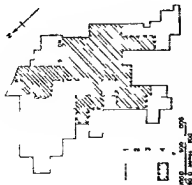
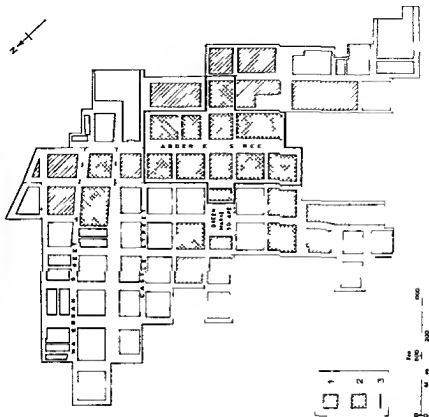


Figure 10.4 The delimitation of the core of the central business district of Cape Town. After *D. H. Davies (1965)*. A A stage in the definition process 1 CBD boundary 2 CBI of 80 3 CBI of 4 4 Hard core as identified by 2 and 3 above

B Final definition 1 Blocks omitted by exclusion rule in which government and municipal offices and department stores offering lower quality and restricted ranges of goods were counted as non-central uses 2 Blocks still retained after application of exclusion rule 3 The final continuous hard core boundary. In this a discrete area has been isolated and the outlying qualifying blocks have been discarded



established. Few attempts have been made to follow these lines of enquiry. One of them is the study of land use in the urban core by Hartenstein and Staack.¹⁷ Six German cities (figure 10-5) were studied and by using Murphy and Vance methods a 'hard core' and 'fringe' were identified. Data relating to these areas were then used for a series of analyses, from which generalizations were derived such as: the larger the total floor area of the urban core, the larger the floor area for all uses, with growing size of the core area, the floor area for retail use does not grow at a parallel rate—probably due to the fact that larger cities have decentralized their retail functions, with growing size of the core area, the floor area in office use grows at a higher rate—probably due to the fact that larger cities fulfil a number of regional, national and international functions which smaller cities do not.¹⁸

Many of these conclusions are not very startling or unexpected, but they are important, for if analysis is to be based on the locational decisions of individual firms then this study shows that they are not simply concerned with making decisions in the abstract in relation to location. The different combinations of users in cities of different size must inevitably be part of the decision making process. Undoubtedly Hartenstein and Staack have made good use of a uniform method of definition, but even so their conclusions are linked to a number of fairly obvious statements about the relative density of uses in the core and the rate of diminution of those uses away from the centre. To a large extent in other studies the fixing of a boundary has become an end in itself, devoid of purpose and hence academically barren. In some ways the search for regional boundaries in the city centre followed the earlier search for regional boundaries in geography and in doing so fell into all the same traps.

Murphy and Vance in their CBD studies were aware of this problem and seem to have realized that definition for its own sake was hardly a stimulating end product of their research. A consideration of the internal structure of the CBD¹⁹ revealed its dynamic and changing nature, for the edges were seen to be either advancing or contracting, and zones of assimilation and of discard were identified and related to surrounding uses. This is an appropriate development, for, as assimilation and discard are considered, attention is directed towards process and away from definition. But these are still only a part of the whole complex of processes operative in the city centre and determining

¹⁷ W. Hartenstein and G. Staack (1967) *Land use in the urban core. Part I* of W. F. Heinemeier *et alia* (1967) 35-52.

¹⁸ W. Hartenstein and G. Staack (1967) 43.

¹⁹ R. E. Murphy, J. E. Vance Jr and B. J. Epstein (1955) 21-46.

STUTT GART



DUSSELDORF



NURNBERG



DUISBURG



BREMEN



ESSEN



Block Types



Borders



land use. Inevitably one is led towards a more realistic evaluation of the central area not being made up of a CBD (with or without a hard core) but of a number of closely associated areas or sub-cores, constantly subject to pressures and with, in consequence, changing boundaries. These areas have emerged and have crystallized out in the long historical process of the town's growth.

Once Davies had relaxed the notion of a single, simple CBD in Cape Town and had lifted out a hard core he was inevitably faced with the problem of these remaining areas and logically proceeded to identify them by means of cluster analysis.²⁹ This is carried out for each category of use by using floor space per lot (the basic areal unit). Each lot with a particular use is plotted and the centre of gravity is found by the standard method of drawing two axes to contain the distribution and by finding the mean of all the distances from each lot to each axis (figure 10.6). Davies weighted the distance values by amount of floor space in each use by multiplying each measurement by the floor space devoted to the use in the lot and then dividing the totals by the total floor space in that use so that the weighted centre of gravity takes areal extent into account as well as locational pattern. The conventional method of establishing the cluster boundary is to draw a circle of radius equal to the mean of all the distances from the individual lots to the centre of gravity or in more sophisticated studies to draw in standard deviational ellipses. This was rejected on account of its arbitrary areal character. Instead each lot distance was expressed as a percentage of the distance of all lots from the centre of gravity, and likewise the floor space in any use was expressed as a percentage of all the floor space in the use under consideration. These were then plotted against each other. In order to bring together strong representation increasing distance was associated with decreasing size by plotting $1/\text{area}$. On this graph the lots which were to be regarded as forming the cluster were identified by a factor of inclusion (F), where $F = A/D$ where A is percentage area and D percentage distance. A series of curves for F , expressed as values of $(1/d)/D$, were used to identify inclusion by totalling the percentage of floor areas of lots to the left of the curve (figure 10.7). Eventually the very high figure of 97 per cent was chosen to identify clusters and a line was drawn which encompassed all the lots identified as making up this proportion. The superimposition of these cluster boundaries produced a complex map of city centre 'regions' (figure 10.8). These were then analysed as part of the structural make-up of the city centre. The conclusions which Davies draws are related to the complexity of the spatial patterning.

²⁹ D. H. Davies (1965): 39 *et seq.* This does not refer to the statistical process of the same name.

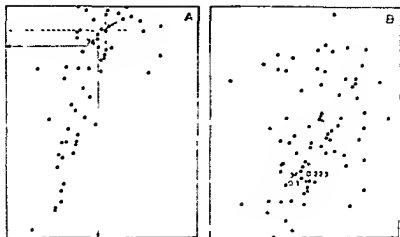


Figure 10-6: The process of cluster analysis *After D H Davies (1965)* The use is household furnishing. Each dot represents a lot or areal unit and **A** shows the southern part and **B** the northern part of the total distribution with some overlap. For each lot (e.g. lot 36 on diagram) the distance to X and Y axes is measured and the mean distances to the X and Y axes for all lots give the centre of gravity. This is weighted by floor space to give the weighted centre of gravity (see p. 218). The process of inclusion is represented in the graph (figure 10.7 p. 220) where the percentage of the distance of each lot from the centre of gravity of all distances is plotted against the percentage floor space in any use in each lot of all floor space in that use. The graph lines of 50% and 97% are drawn as described in the text (p. 218).

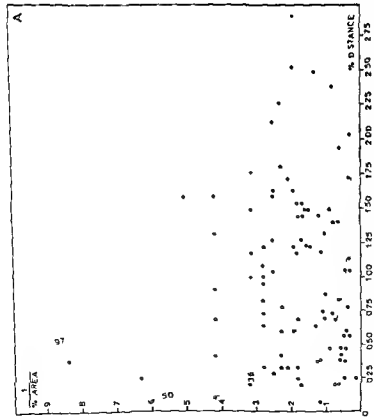


Figure 10-7 Identification of clusters in central Cape Town household furniture sales After D H Davies (1965) The process is explained in the text page 218 and in figure 10 6 p 208 A inclusion process B limits of Cluster

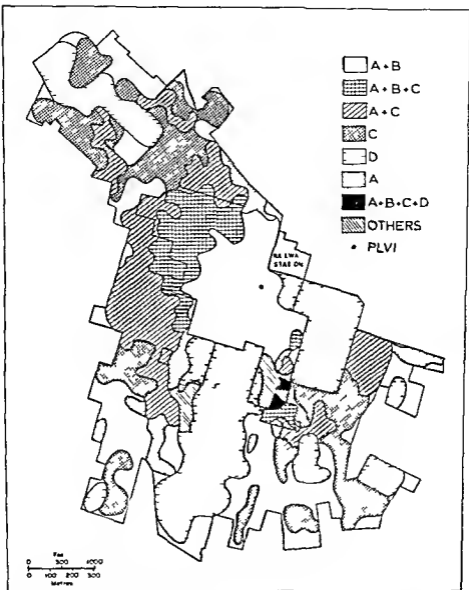


Figure 10.8 The overlapping of major clusters in central Cape Town
After D. H. Davies (1950)

A retail uses **B** office uses **C** Automobile industrial wholesale and commercial storage uses **D** public and government uses (PLVI) peak land value intersection

which has to be set against the discrete CBD concept, and also the relation of this patterning to concentric zones, sectors and nuclei, a backward look to the generalizations of whole city structure which is not illuminating. Rightly he comments, 'it is suggested that currently there may well be diminishing returns in any delimitation studies per se',²¹ but he lets his study end rather inconclusively, neither following up the concept of linkages which he introduces, nor the historical emergence of the areas identified, that is, the way present linkages have come about, for he states 'cause and effect are interwoven in a manner too complex to unravel without historical investigation beyond the scope of the present study'.²²

4 HISTORICAL PROCESSES AND THE CBD

Some attempts have been made to provide the essential historical depth to the unravelling of the complex contemporary situation. Carter and Rowley in a study of Cardiff in South Wales²³ presented data equivalent to that used by Murphy and Vance but, without attempting an objective definition of a CBD, tried to demonstrate the way in which the present patchwork of the city has emerged from a process of development from the medieval kernel mainly during the nineteenth century when the town grew rapidly, and in relation to the physical conditions of site and the coming into play of a series of barriers which formed part of the city structure itself.²⁴

After the initial establishment of the Norman castle and town in the eleventh century and the subsequent Anglo-Norman domination of southern Glamorgan, Cardiff became a borough deriving its livelihood from its small but rich sphere of influence, which included the eastern part of the Vale of Glamorgan. John Speed's map of 1610 (figure 10.9) may be taken as representative of the whole period between 1350 and the late eighteenth century. At that time, the two areas dominated commercial activity. The main market was in the northern part opposite the castle gate and the various guild halls were in close proximity. Secondary commercial activity was associated with the town quay and its allied warehouses.

This simple situation was radically altered with the growth of industry along the northern rim of the South Wales coalfield during the second half of the eighteenth century. Cardiff was near the mouth

²¹ D. H. Davies (1965) 87.

²² D. H. Davies (1965) 74.

²³ H. Carter and G. Rowley (1966) *The morphology of the central business district of Cardiff* *Trans Inst Br Geogr* 38, 119-34.

²⁴ For a general account of the history of Cardiff see W. Rees (1962) *Cardiff, a history of the city* (Cardiff).

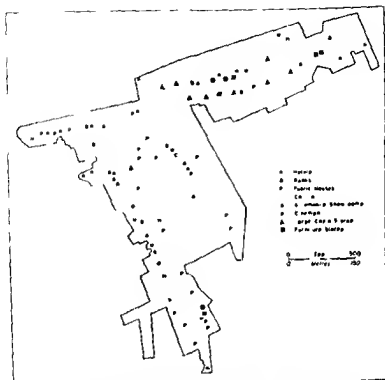


Figure 10-11B The distribution of selected functions within the retail area of central Cardiff 1960 After H Carter and G Rowley (1966) The contrast between the older area corresponding to the medieval town and the newer eastern extension is quite clearly revealed These figures indicate the specialized regions which had emerged in central Cardiff by 1960 In particular distinctive office areas had developed taking over former residential property A small financial area is identified partly related to the old town quay and the commerce associated with it Modern regional structure is the joint product of inherited tradition and the demands of modern special uses

growth pattern so far suggested with working men's houses outside the walled area is in line with the concentric zone theory of growth. However, as has been noted Hoyt suggested that a high-quality residential area will tend to develop near to the centre and subsequently, extend along a main line of communication in sector form. This happened in Cardiff where the main extension eastward beyond the old east gate, was an area (Crockerton) of much larger houses of well-to-do people (figure 10.9). This sector had offshoots along the dock feeder and particularly northward alongside Cathays Park the protected castle estate.

If the areal pattern of central Cardiff as it was in 1961 is now examined (figure 10.11) it will be seen that the retail core bears a striking resemblance in its areal extent to the town of 1610 but with a marked eastern extension along what is now Queen Street. The remaining areas have emerged as growth brought new demands on space and characteristic central area uses took over the inner parts of the city.

The Cardiff core depicted on figure 10.11 in some detail lacks the precision of areal definition which Murphy and Vance²⁵ introduced into the study of the CBD boundary or which Davies following Rannells²⁶ brought into the more general structure. What it does bring into play however is the dynamic reality of the CBD or in this case the retail core as merely a part of a patchwork of specialized areas at the city centre, and it demonstrates how in the process of time this patchwork has emerged due to the needs created by an industrial hinterland and the pressures brought to bear upon the physical space available taking account of physical barriers.

About the same time a parallel study appeared of central Boston which attempted to cover much the same ground.²⁷ Three maps (figures 10.12A, B, C) indicate the basic pattern of development as successive specialized areas crystallized out as the city grew rapidly. From an early nineteenth century pattern where specialized business was restricted to a small section of the waterfront and the market halls there was a progressive segmentation of specialized activities into financial, administrative, retail and wholesale commercial functions occupying by the early twentieth century an area larger than the original town. The first distinctive area to emerge was that devoted to financial and insurance services which were valued by the merchant community, and warehouse accommodation developed nearby. The development of 'mass consumption' and 'mass transit' resulted in the

²⁵ See above pp. 211-13.

²⁶ J. Rannells (1956) *The core of the city* (New York).

²⁷ D. Ward (1966) The industrial revolution and the emergence of Boston's central business district *Econ. Geog.* 42, 152-71.

emergence of distinct retail and wholesale sections whilst manufacturing was displaced. At the same time financial and administrative functions were enlarged to form an extensive segment. Thus Ward depicts how from a small nucleus, and related to changes brought about in the nineteenth century, the distinctive parts of Boston's CBD emerged. At no point in his illustrative maps is the CBD as such defined nor is there any attempt at objective definition, indeed no direct evidence is produced at all to support the identification of areas or directions of growth. The prime concern, as in the Cardiff study, is with process rather than with definition.

5 CLUSTER IDENTIFICATION AND PROCESS

From the various studies to which reference has been made there does emerge a methodology for studying the central areas of cities. It is concerned with areal definition and the unravelling of process, both at an aggregative level. It can be briefly stated as follows:

- 1 Define distinctive contemporary areas by means of cluster analysis or some like technique, the greater the degree of objectivity the better
- 2 Interpret these areas in terms of the growing city by taking cluster analysis back into the past and by identifying movements in the centre of gravity of clusters and changes in the size and shape of clusters. This identifies not merely zones of assimilation and discard, but the larger and more complex process by which special uses become segregated and by which the locational characteristics of uses become fixed—by which the amorphous core develops into the city centre
- 3 This interpretation is carried out by means of tracing the emerging spatial linkages between functions and the spatial incompatibility between functions, which respectively attract and repel and are the operative factors in the developmental process

A study of central Manchester by R. Varley has attempted to follow through this method.²⁸ At the outset by using the location of establishments from directories, centres of gravity and indices of dispersion (the mean of all distances from the centre of gravity) were calculated. The sorts of results produced are illustrated in the table on page 227.

If the distribution of stock and share brokers and of travel agents is examined (figure 10-13) then the difference in the degree of scatter

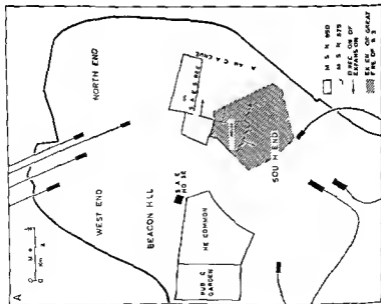
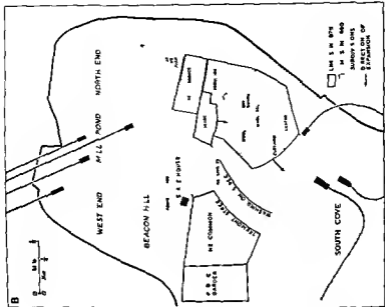
²⁸ R. Varley (1968) *Land use analysis in the city centre with special reference to Manchester* (University of Wales: unpublished M.A. thesis)

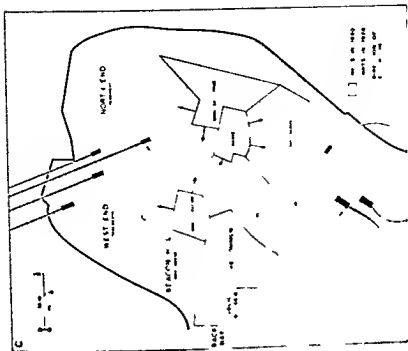
indicated in the table below is apparent and this has clear implications in relation to linkages. The very close links of the stock brokers with

<i>Type of establishment</i>	<i>Index of dispersion</i>
Stock and share brokers	1.77
Barristers	2.33
Wholesale jewellers	2.70
Building societies	3.24
Insurance offices	3.28
Solicitors	3.36
Estate agents	4.03
Accountants	4.22
Manufacturers' agents	4.30
Merchants	4.69
Cotton spinners and manufacturers	5.17
Travel agents	5.90

the Exchange and the associated financial area produce a tight distribution. On the other hand travel agents have a number of different links partly with the business office area, partly with transport facilities or their termini and partly with the retail area where a shop front is necessary in terms of public service. Moreover, in Manchester there is another factor, for whereas stock broking is a long established profession, having built up associations and developed concentration over a considerable time, travel agents are relative newcomers and have had little time to move together to produce a well marked area. It is possible to carry these methods back into the past and to construct similar maps, and movement over a considerable period of time can be shown (figure 10.14). The close knit areas devoted to stock brokers, as well as to legal professions, are clearly apparent in Manchester where total movement of the centre of gravity over a hundred years has been no more than two hundred feet. Travel agencies did not exist at these earlier dates.

This preliminary analysis was followed by the employment of land-use data (floor space in square feet) for thirty basic categories made available for blocks and parcels within blocks, by the Manchester County Borough. A combination method was used by which the various uses in each block were ranked according to the percentage of floor space occupied. A direct map can be made of first (and indeed each succeeding) ranking use for each block and this can be used to identify core areas, which can be closely related to those established by cluster analysis of establishments. But a real problem remains, since





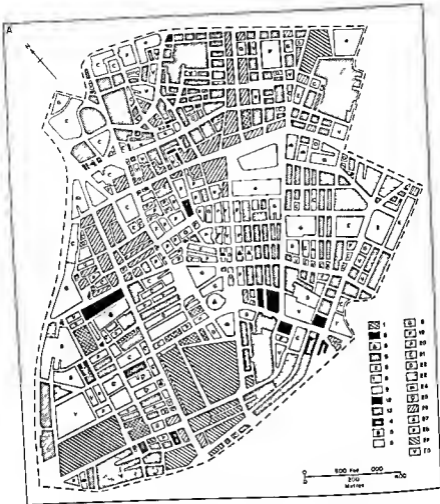


Figure 10-15 A The distribution of first ranking land uses by blocks in central Manchester in 1966

The key to the shading is as follows: 1 Churches and public places 2 Entertainment 3 Cultural including museums and libraries 4 Indoor games 5 Wholesale and covered storage 6 Open storage including builders yards 7 Commercial art studios 8 Radio TV and film studios 9 Open land including parks and playing fields 10 Waste and derelict land 11 Special industry (mining, smelting or casting) 12 Light industry—those which could be carried out in a residential area without detriment to the amenity 13 All general industry excluded from 11 and 12 14 Health 15 Education 16 Cleared building sites and buildings under construction 17 Miscellaneous including abattoirs kennels and riding stables 18 Government offices 19 Financial offices 20 Professional offices 21 Commercial offices 22 Other offices 23 Public services 24 Hotels 25 Residential uses 26 Retail 27 Public houses 28 Car parks 29 Transport including filling stations railway land and airports 30 Vacant. *Note* all the uses are not represented on the keys since only the relevant have been included. The full list is given here as an indication of the bases of analysis.

Figure 10-15: B: Land use combinations in central Manchester in 1986

For method see text. The complexity of the original makes it impossible to reproduce the whole. This area is the north eastern corner of A. The key numbers are as in A, although a different shading scheme is used

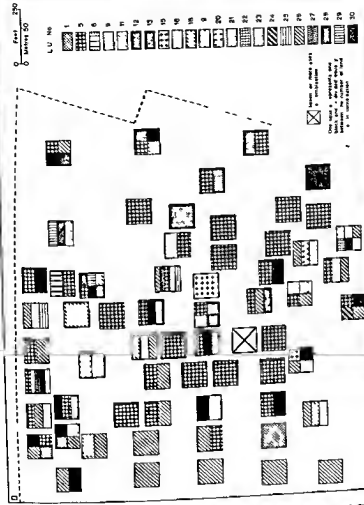




Figure 10-15 C Dominant land use regions in central Manchester in 1966. This is part of Varley's summary map. Area 1 is predominantly an area of storage and wholesaling with a strong retail element whilst Area 6 is the traditional office area. The main retail areas are 3 where retail is virtually a mono use, 4 where it is in combination with a wide variety of uses and 8 which is the quality retail area where office uses are in combination. The location of the areas on this map can be identified by comparison with A where the boundaries of the study area are indicated. This figure covers the northern part only. Rather than give conventional names such as retail core, Varley has used the neutral terminology of Area 1. Each area has a characteristic combination of uses A, B, C after R. Varley (1968).

centages of other land uses represented. This process continues, comparing actual with theoretical until all the uses in a block have been dealt with. When all the totals have been obtained then the lowest one marks the point at which a block is nearest the theoretical or ideal situation: that is where all the floor space is equally divided between the types of use present. Thus if the fourth total is the lowest then the block is regarded as a four use block and the four particular uses are regarded as in combination and 'combination' in this context can be regarded as the equivalent of in block linkages. Each block can be mapped according to the number and sorts of land use in combination and distinctive areas can be identified.

It is not possible or necessary here to follow the detail of this study, but it is worthy of note that a virtual mono-retail area does emerge (figure 10.15) though most other areas are characterized by combinations of use. Thus Area 1 is identified by Varley as predominantly one of

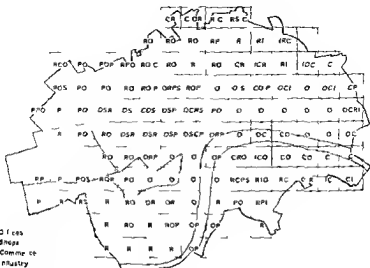
storage, largely wholesale in character. But there is also a strong retail element intermingled including four single use blocks. This is probably due to a variety of small retail establishments serving the wholesalers (indeed some establishments are both wholesale and retail) particularly confectioners, tobacconists and cafes. Light industry, clothing manufacture and printing, are also represented but heavy industry is excluded owing to congestion and high land values. Area 6 emerges as the financial area already discussed which is dominated by financial offices. Varley calls this 'the traditional office area' in the light of its stability, which he has already identified.

At this point a similar study by Goddard of London's central area can be considered.³⁰ Only six basic uses were considered but these provide a basic pattern of combinations from which land use zones can be derived (figure 10.16). 'The historic dual centred core (the City) to the east and Westminster to the west) has both the strongest vertical development and the greatest segregation of uses, offices having virtually eliminated all other functions.' These office areas are themselves composed of distinctive sub-groups as Goddard has shown elsewhere using multivariate analysis techniques.³¹ A third sub-core is formed by the West End distinguished by a retail-office-residence combination and characterized by the lateral extension of retailing into the residential areas to identify areas of conversion. These are very different from the conversion about the city core which is characterized as 'decaying fringe', where deteriorating residential areas unsuitable for office conversion are taken over for commercial and industrial use. Finally the 'mixed area' is the area of earliest expansion west of the city which originally was one of fashionable squares—Covent Garden and Soho Square. These degenerated in the nineteenth century as the fashionable areas moved further west and Regent Street was constructed as a western limit. The result in modern London is a mixed area containing a variety of uses with property in a variety of conditions. The end product of Goddard's analysis is similar to those already considered.

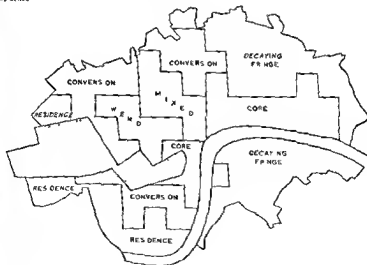
It will be apparent that these areas are still arbitrarily defined, although it would not seem difficult to devise an objective method of association by linkage analysis as Goddard does for his office areas. Even so, and without much objectivity in areal identification, they seem vastly more useful than an area ringed around and labelled

³⁰ J. Goddard (1967) The internal structure of London's central area. In W. F. Heinenmeyer *et alia* (1967), 118-40.

³¹ J. Goddard (1968) Multivariate analysis of office location patterns in the city centre: a London example. *Reg. Stud.* 2, 69-85.



- O Offices
- S Shops
- C Commerce
- I Industry
- P Public Buildings
- R Residence



CBD, or even split into core and fringe. The above analyses demonstrate the multiplicity of relationships that exist between uses and lead directly to the questions as to what are the precise needs of any use of central urban land and how can these be satisfied in locational terms within the structures that comprise the city centre.

There seems little point in providing here an exhaustive catalogue of the considerations which will influence each category of urban land user, even if it were possible. But it is apparent that the decisions made at the micro level of the firm, or the individual, build up into the aggregate pattern and the more that is known about this decision-making process the more realistic will be the appraisal of the aggregate condition. Thus Nelson³² put forward eight principles operative in the selection of a retail site.

These are as follows:

- 1 Trading area potential. A minimum volume of business is an obvious first necessity. In central place theory terminology it must be possible to tap sufficient custom to pass the minimum threshold requirement.
- 2 Accessibility to trading area. Maximum accessibility to the population of the trading area is needed. Presumably this operates on a regional and on a local city centre scale. It results in peak land value intersections or, in more everyday terms, competition for corner sites at main cross roads or squares.
- 3 Growth potential. Access to areas with growing populations and rising incomes is needed.
- 4 Business interception. A site between the main concentration of working population in the downtown area and the main shopping

³² R. L. Nelson (1958) *The selection of retail locations*, 52 (New York)

Figure 10-16. Land use combinations and land use zones in central London. The upper diagram shows the uses in combination and is similar to that in figure 10-15B. The lower diagram shows a resolution of these combinations into land use zones. The detail of use and the scale of work is cruder than that for Manchester but the basic principles are the same. In this lower map W End stands for the West End (Mayfair and St James) giving an office shop residence combination. core refers to the City of London and to Westminster. After J. Goddard in W. J. Heinemeier et alia (1967).

centre will enable customers to be intercepted along the main lines of daily movement

- 5 Cumulative attraction A number of similar units in a small specialized area can exert a much greater influence on potential customers than an isolated store The possibility of inspecting several shops offering similar goods and providing a wide choice that is a number of complementary units, will generate a pull of its own
- 6 Compatibility The location in an area of compatible uses will generate maximum customer interchange
- 7 The minimizing of competitive hazard This is self-explanatory for it is common business sense to avoid a location where competition is critical
- 8 Site economy A site which provides maximum economies through ease of access and shape is obviously an advantage

Not all these principles work together for cumulative attraction and compatibility may well bring a store into an area of competitive hazard but nevertheless they form a basic group of tenets relative to store location At the same time and at a level of detail, these kinds of principle have to be reconciled with those relative to social power which have been discussed earlier Competition for sites is not resolved simply in terms of the market but in terms of the play off between competing interests and the power they can exert at a particular time and relative to an existing set of structures²³ If comparatively little is known of the needs of users still less is known about the powers they can deploy Thus in a sample of 373 establishments in Worcester, Mass., Ames has shown how variation in rank order occurs according to number space occupied and size of establishment²⁴

Type of establishment	Number	Rank of establishments by	
		Space occupied	Size by employees
Retail	1	3	6
Services	2	4	5
Manufacture	2	1	1
Wholesale	4	2	2
Transport	5	5	3
Finance	6	6	7
Government	7	7	4

The implications of this table are of greatest significance in terms of the

²³ See page 180

²⁴ Personal communications from D Ames formerly of the University of Cincinnati Department of Geography

way users can obtain central sites, indeed they lead on to a consideration of the very heterogeneity of the central area and the external economies to firms which result from it.³⁵ At this point one is merely outlining the many problems about the central area of the city still to be studied.

The general conclusion which emerges from the previous pages, however, is that attempts to resolve the heterogeneity and complexity by cluster analysis or by land use combination methods and attempts to isolate and examine decision making situations are trying to do the same thing at different levels of generality. Clusters are created by the linkages generated by systems of activity which characterize the users of central urban land. This was apparent in the structure of a legal area outlined in the last chapter and it is a theme taken up by a number of writers concerned with urban land use. Bourne writes that an approach can be taken which focuses on 'communication or linkage requirements between activities. By tracing the linkages or "movement systems" for and between establishments, some additional insight is provided into the locational pattern of urban land use and variations in the degree of spatial association between individual users.

Although it is difficult to extract theory from these discussions, the emphasis on the dynamic interaction between location and activity rather than on accessibility alone represents an important addition to existing generalizations.³⁶

Undoubtedly the most effective analysis of this situation was that by John Rannells in his book *The core of the city* which was published as long ago as 1949.³⁷ At this point a further complexity must be introduced which is inherent in the analyses of Carter and Rowley and of Ward and which is the particular concern of Bourne. All the generalized models assume that there is a constant plane surface to be developed whereas in fact to the entrepreneur, faced with making a locational decision, the city consists of an existing stock of buildings. As change takes place, as associations of uses develop, they have to fit into and adapt, or replace, a given set of structures. In summation, therefore, 'the physical city exists because of the patterned activities of its population as they accumulate and are accommodated at definite locations in establishments'.³⁸ It follows 'that individuals and establishments in action make the city, which in turn shapes their activities, that ongoing patterns of action explain the uses to which available structures are put,

³⁵ B. Thorngren (1967) External economies of the urban core. In W. F. Heunemeyer *et alia* (1967), 413-22.

³⁶ L. S. Bourne (1967) *The private redevelopment of the central city*. Univ. Chicago Dept. Geogr. Res. Pap. 112, 19 (Chicago).

³⁷ J. Rannells (1956).

³⁸ J. Rannells (1956), 16-17.

with the result that the physical environment is sustained by continuance of activities, while physical changes reflect shifts in the underlying activity systems into which the whole complex of urban life is separated for analysis.³⁹

Davies's work on Cape Town, which has been considered already, was largely derived from Rannells's study of central Philadelphia. But Davies was sidetracked by his concern for definitional problems on the argument that spatial notions were the basic geographical concern. Rannells was less concerned with defining any preconceived area than with identifying the interlinked systems of activity which were lodged in a general central area. He used the city block as his basic unit and the number of establishments and amount of floor space in each block as a measure of activity, divided into manufacturing, wholesaling with stocks and without stocks, business services, consumer services and retailing. Rannells uses a number of conventional measures, such as centre of gravity and index of dispersion, but as part of his analysis he establishes a reference core (not a CBD) which is an arbitrarily defined area to which specialized distributions can be related.⁴⁰ This is defined by isolating those blocks, ranked in order, which contain half the total of establishments of all types (34 in all) and half the total floor space (55 in all). These two measures include 30 which are common to both measures so that the reference core consists of 59 blocks, i.e. $30 + (34 - 30) + (55 - 30)$. A similar reference core can be worked out for each separate use and by superimposing these maps the implied relationships (linkages) can be identified. In a sense Rannells's work is not locational, he is using locational data to establish a patterning of relationships (hence Davies's objection). This he does by presenting his conclusions as showing the central area of the city as affected by a three way screening (figure 10.17).⁴¹ The three screens are accessibility, which is the traditional factor emphasized relative to the central area but which needs to be related both to people and to the goods handled, availability, which is concerned both with the amount of space required and with the particular advantageous location required, and the linkages, to other businesses and the public. To a large extent Rannells was responsible for presenting the CBD in a new light, not as an area to be defined but as the product of a complex of forces which determined locational decisions, a complex which had to be unravelled before anything useful could be said about the area.

³⁹ J. Rannells (1956), 17.

⁴⁰ J. Rannells (1956), 117-21.

⁴¹ J. Rannells (1956), 151.

6 THE ZONE IN TRANSITION

It is relevant here to introduce the notion of the Zone in Transition (Tz), for immediately the attempts at rigid definition of the CBD are relaxed then the surrounding area conventionally making up the Tz is brought into consideration. Indeed much of the discussion following the work of Murphy and Vance has been of the whole central area rather than an isolated CBD. It was inevitable that following the work of Murphy and Vance attempts should be made to define the

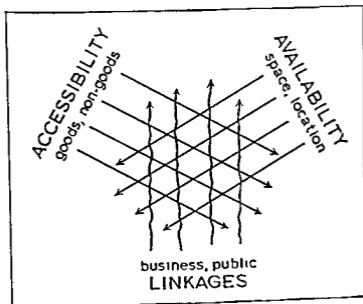


Figure 10-17 The threeway screening of city centre locations After J Rannells (1956)

Tz on similar grounds. Among those making this attempt are Robert E. Preston and D. W. Griffin.⁴² The Tz, they point out, has been traditionally viewed as an area of mixed commercial and non-commercial land use, tending towards deterioration and blight, and locationally separating the retail heart of the city from surrounding residential neighbourhoods or heavy industrial districts. Usually

⁴² R. E. Preston and D. W. Griffin (1966) A restatement of the transition zone concept *Ann Assoc Am Geogr* 56, 339-50. R. E. Preston (1966) The zone in transition: a study of urban land use patterns *Econ Geog* 42, 236-60.

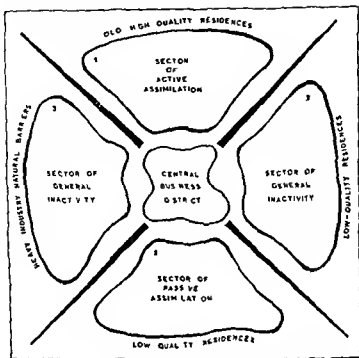


Figure 10.18 The zone in transition After R. E. Preston and D. W. Griffin (1966)

present are such intensive non retail activities as off street parking, warehousing, light manufacturing, wholesaling with stocks, special professional organizational services, transportation terminals and multifamily residences.⁴³ The basic notion of this zone is simple. Residential uses are extending outward and as more space is demanded by central users so the inner residential areas are taken over in a process of invasion and succession. The greatest change of use is concentrated in this inner zone which is, therefore, in transition. To some extent the upward growth of the CBD, together with the suburban development of industry and of retail trade in suburban or out of town shopping centres, results in a diminution of demand for space in the zone and consequently in a lack of renewal of

⁴³ R. E. Preston and D. W. Griffin (1966), 341

what is the oldest building stock, this in turn results in deterioration and blight

Preston and Griffin depict the Tz as in figure 10-18. It is seen as consisting of a sector of active assimilation where new uses are in process of development, often of being taken into the CBD, characterized by high-quality uses. Second there is a sector of passive assimilation where changes are slower and, indeed, to some extent it is a zone of discard from the CBD with non CBD uses such as warehousing taking over. Third, there are discontinuous sectors of general inactivity where little change is in progress. These notions are closely linked with the zones of assimilation and discard proposed by Murphy, Vance and Epstein.⁴⁴

In attempting an areal definition of the Tz, Preston adopts a procedure parallel to that of Murphy and Vance and postulates a contrast between 'transitional zone' and 'non transitional zone' uses. It is simpler here to note the non transitional zone uses as the list is much shorter: these are residences, heavy industry, vacancy, public open space and railroad yards. The Tz is isolated by taking out from the centre the CBD as identified by the Murphy and Vance method and then by establishing an outer boundary where the amount of land in transition zone uses falls below thirty per cent, a value chosen by a trial and error process. This provides (with some need for other minor rules) a neat boundary (figure 10-19). The proportions of uses found in these areas as averages derived from three cities were

Governmental organizations	24.5
Wholesale and storage	10.9
Light industry	7.8
Retail	7.0
Transport	4.1
Parking	4.6

Among the non-transitional-zone uses residence accounted for 19.6 per cent, heavy industry 7.0 and vacancy 7.7. These results themselves cast some doubt on the whole procedure, for a non-transitional zone use accounts for the second highest proportion of space. But the definition is itself circular, the uses chosen defining the area and the area reflecting the uses.

Consideration of the patterns revealed by analysis of three cities led to a further development of the Tz concept. 'Within the zone the clusters (of uses) are generally arranged in sectors and are separated

⁴⁴ R. E. Murphy, J. E. Vance and N. Epstein (1955) 43

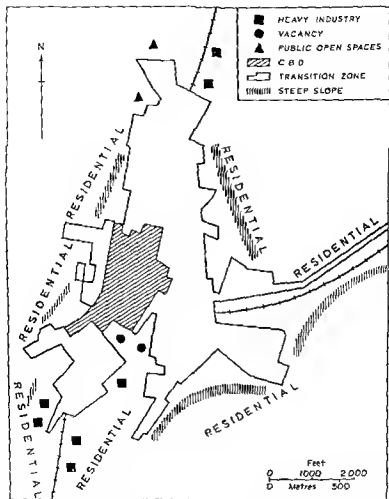


Figure 10-19: The boundary of the zone in transition, Worcester Mass. Compare with figure 10-3 where the CBD was defined *After R E Preston (1966)*

from one another by areas of less intensive and less specialized land-use.⁴⁵ The outstanding clusters identified were

- 1 Wholesaling private and commercial storage, light industry and transport
- 2 Public organizational and headquarters office establishments
- 3 Automobile sales and services and parking
- 4 Financial establishments, general offices, variety stores and transient residences
- 5 Food, household, service trade and various retail establishments

It is immediately apparent that Preston is directly echoing the sort of analysis that Rannella carried out. He is identifying clusters derived from linkages so that his first group, the members of which are strongly associated together, directly reflects the category 'goods handling' which Rannella uses. Like Davies, however, the study of the Tz is dominated by definition of areas as an end in itself, so that obvious lines of development are not followed. The nature of the links which result in these associated groups, their coming together over time, their relationship to available space and locations, and their relationship to existing structures are not traced. Bourne has developed a critique of the Tz concept which is particularly pertinent.⁴⁶ It is based on 'emphasizing the concept of structural adjustment, as a continuous process of change in the spatial structure of the city as a system, in contrast to the approach of defining areas which offer certain characteristics of transition. Certainly the whole city is in a process of change not solely the area adjacent to the CBD and in many ways the real problems are related to the areas which are *not* experiencing change and are not in transition in that sense but are derelict and decayed. Ageing and decay are inevitable and the older city centre suffers first. Normally there is renewal and the real problem is why does deterioration persist and why is the sequence of decline and renewal disrupted.'⁴⁷

7 CONCLUSION

To a great degree our understanding of the operative processes and consequent usage patterns in the city centre is completely inadequate. To chop out arbitrarily defined pieces and give them names is useful in so far as it advances comprehension of the complex, but it is no solution. Careful and detailed study of process is essential. This involves

⁴⁵ R. E. Preston and D. W. Griffin (1966), 344.

⁴⁶ L. S. Bourne (1968) Comments on the transitional zone concept *Prof Geogr.* 20 313-16.

⁴⁷ L. S. Bourne (1968) 316. See also pp. 276-85.

an effective realization of the interests of users of central land, the activities in which they are involved, the links which they require and the resources, both economic and political, which they can deploy. This must be carried out in the context of continuing change and flux over time. This presents a fascinating if formidable range of influences to be taken into analysis but will bring some understanding of the city centre that much nearer.

Perhaps some objection may be taken to the rather cavalier dismissal of spatial definition of regions which is so traditionally a geographical approach. But the time when extrapolation of complex cause from a pattern of areas was productive of progress in this field has long gone.

Notes on further reading

The early papers by R. E. Murphy and J. F. Vance, Jr (1954a and 1954b, see footnote 1, 1955, see footnote 14) referred to in the text should be read, whilst a convenient summary is available in

MURPHY, R. E. (1966) *The American city* (see footnote 11)

Various contributions have been brought together and summarized by Murphy in

MURPHY, R. E. (1971) *The central business district* (London)

The two works by Rannells and Davies are also essential

DAVIES, D. H. (1965) *Land use in central Cape Town: a study in urban geography* (see footnote 16)

RANNELLS, J. (1956) *The core of the city* (see footnote 26)

Davies's study has been updated in

DAVIES, D. H. and BEAVON, K. S. O. (1973) Changes in land use in central Cape Town. *Dept Geogr and Envir Studs Univ Witwatersrand, Occasional paper 10* (Johannesburg)

A volume devoted entirely to the city centre but with contributions of varying quality is

HEINEMELJER, W. F., VAN HULTEN, M. and DE VRIES REILINGH, H. D., editors (1967) *Urban core and inner city. Proceedings of the international study week, Amsterdam (Leiden)*

An older symposium is

NORRBO, K., editor (1960) *Proceedings of the I G U Symposium in Urban Geography, Lund 1960, part IV, the city centre* (Lund)

The following two papers on the zone in transition should be read

PRESTON, R. E. and GRIFFIN, D. W. (1966) A restatement of the transition zone concept (see footnote 42)

PRESTON, R. E. (1966) *The zone in transition: a study of urban land use patterns* (see footnote 42)

as should the critique by

BOURNE, L. S. (1968) Comments on the transitional zone concept (see footnote 46)

On linkages an early but useful paper is

MORGAN, W. T. W. (1961) A functional approach to the study of office distributions *Tijdschrift voor Econ. en Soc. Geog.*, 52, 207-210

whilst a more thorough statistical investigation is

GODDARD, J. B. (1968) Multivariate analysis of office location patterns in the city centre: A London example (see footnote 31)

A more general study on office location is

COWAN, P. (1969) *The Office, a facet of urban growth* (London)

and another work which indicates the direction in which the study of offices is moving is

GODDARD, J. B. (1973) Office linkages and location *Progr. in Planning* 1(2), 111-232

A series of research papers of the Department of Geography at the University of Chicago forms a most stimulating and valuable source of further reading. The relevant publications are

BERRY, B. J. L. (1963) *Commercial structure and commercial blight* No. 85

BOURNE, L. S. (1967) *Private redevelopment of the central city* No. 112 (see footnote 36)

SIMMONS, J. W. (1964) *The changing pattern of retail location* No. 92

SIMMONS, J. W. (1966) *Toronto's changing retail complex* No. 104

the larger is the city and hence the attractions of the facilities at the centre are very high. At the same time the larger the city then the greater is the distance to be traversed to the central facilities and the more irksome the journey. It follows that the richest part of the population, the upper classes, will also be found in luxury houses or apartments adjacent to the centre where the nature of the buildings can shut out the environmental problems. Moreover, the very wealthy can maintain the *town apartment* and the *country house*, maximizing the advantages to be derived from both residential locations and minimizing travel difficulties by cutting them down to less frequent intervals than the daily journey, such as weekends only. In terms of historical explanation the introduction of a sector interpretation, based on the maintenance of an upper class residential area at the centre and extending outwards, accomplished much the same sort of variation on the over rigid concept of zones. In this way the early simplistic schemes have been modified.

At this point it is necessary to consider precisely what are being employed as the defining criteria within the overall concept of the 'residential areas'. Undoubtedly the earliest geographical concern was with structures, that is with houses as part of the physically visible scene, rather than with areas defined in the more nebulous terms of income or social status. Again the problem of use and structures arises and once more the general trend has been to divorce the two in order to clarify procedures. This divorce is seldom complete: studies of social areas often include the physical condition and amenities of housing as a variable, while studies of housing as such usually employ terms such as '*working class houses*', but this sometimes reflects lack of clarity in research design as much as a desire to reconcile use (in this case interpreted as social class) with structure. In general the study of structures has become the domain of the historical geographer and has strong links, therefore, with historical interpretations of city patterns. The study of income, class and status as spatial variables has been pursued by social geographers and is linked more closely to structural theories of city patterns. In view of the haphazard way in which references to contrasted city areas are couched, now in terms of a type of housing (inter-war semi-detached), now in terms of income (upper income bracket housing), now in terms of class (working class areas) it becomes vital to identify quite clearly which particular notion is being employed as the key criterion of definition.

The two bases of identifying areas, by type of building or by social category, can be separated for purposes of analysis, though once more it must be emphasized that this is only a convenient simplification even if it is preferred to the confusion of terminology that has occasionally

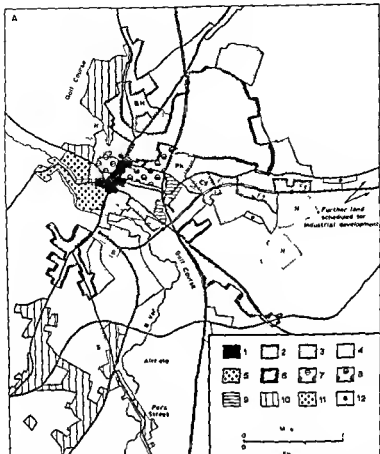


Figure 11-1A: The urban regions of St Albans, 1950
After H S Thurston (1953) 1: city centre, 2: industrial areas (F Fleetville Camp area), 3: inner zone of mixed development, 4: east suburban fringe, 5: Kingsbury promontory, 6: northern residential belt and southern residential areas (whether detached or semi-detached, all the houses possess a generous street frontage and deep gardens so that there are only 3-5 houses per residential acre), 7: Gombards (late nineteenth-century villas, many with three storeys, set in wider more pleasant streets'), 8: inner Hatfield Road professional quarter, 9: city station environs, 10: northwest and southwest suburbs ('a haphazard intermingling of different types and classes of dwellings from the best detached houses to the worst types of shack bungalows'), 11: medieval remnant, 12: small areas of better houses within the east suburban fringe. This is a characteristic map of residential areas in conventional terms. In spite of Thurston's detailed mapping method the various areas have been given locational names (rather than names indicating their physical character) largely because of the variety of structures.

(B)	Growth Phase	Functional Zone	Function-form Relation	Relief	Fabric Materials
Old town (KERNEL)		Enclave(s)	Residues	Architectural dominants	Traditional, or imported stone
I	Late eighteenth and early nineteenth century	Commercial CORE with prongs outside kernel	Extensive replacement of new façades	High buildings, point blocks rugged profile, irregular street cornice	Concrete replacing traditional
N		Outlying of residence	Conversion rather than replacement	Low buildings, little relief except churches, terrace housing in formal lay out	Mixed
T		Decayed inner zone of mixed use		some replacement in flat blocks	
		Workshops warehouses high density residence (slums) and high flats) railway space			
E		Professional and administrative quarters	Converted houses		Brick or stucco and slate
G	Railway age	Industry and tightly-packed housing mixed	Some conversion but mainly obsolete forms still in use	Terrace ribbing with factory and neo Gothic church salients gas-holders	
U	before 1914			Villa studding	
M	Railway end	Industry and housing segregated	Forms conforming to current functions	Intermixture of roofs and tree tops	Brick (much Fletton) rough cast and tile
E	automobile age since 1919	Villa housing in open, bourgeois suburbs and municipal estates	Chain-store façades in shopping centres		Much foliage
N		Spacious factory lay-outs		Factory scaling power-station chimneys and cooling towers	
T					
S					
Urban fringe		Village enclaves			Traditional
		Interim development amenity space and surviving farmland allotments and market gardens	residential ribbons and outliers	urban utilities e.g. cemeteries	sewage works

Figure 11-1B: British Town Structure After A E Smiles (1964) This table attempts to present in summary form the sorts of influences which have been operative in creating British town structure and generalizes the specific case of St Albans in figure 11-1A

been employed even to the extent of 'very large residence' combined with such terms as the 'middle wealthy' ⁶

1 STRUCTURES THE ANALYSIS OF HOUSE TYPES

It is not difficult in general terms to integrate the consideration of structures with some of the ideas prevalent in social studies. 'Filtering down' has long been used to interpret the broad changes in major housing fashions. In Britain in the late eighteenth and early nineteenth centuries the terrace was the main element in urban building reaching its apogee in the Regency terraces of west London and in the great squares by which the rapid westward extension of the city was accomplished. It appeared too in the growing provincial cities, such as Bath and Cheltenham. But in those towns which were expanding most rapidly and without the architects to design them or the resources to sustain them the terraces degenerated into little more than rows of cottages or long, monotonous lines of mean houses. The result was to put the terrace completely out of fashion, so much so that only at present has any attempt at revival of this compact and characteristically urban form been possible. As the terrace filtered down in esteem its place was taken by the attempt of the Victorian bourgeoisie to imitate their social betters by building separate houses in their own grounds, a middle class version of the great country house. As this in turn was transferred to the 'mass consumption society' it degenerated into the suburban villa or semi detached house, the garden front and back a poor remnant of the large estate, the dog of the livestock! It is appropriate that many of these villas were built in imitation of the country house and 'Stockbrokers' Tudor' epitomizes much, even if it does add a social class qualification to the structural characteristic and reintroduces the separation which has been adopted.

The filtering down of the separate house, the deterioration of its social cachet, has in turn rehabilitated the terrace and it has become identified not only as a respectable but even a stimulating element in contemporary townscapes. Fashions are essentially cyclical but there is also clear evidence that types of town residence respond in popularity to a clear process of innovation, adoption and filtering down the social scale, abandonment and then readoption once the 'lower orders' have given them up.

There have been few studies of the above sort in a geographical context, though some have been closely related,⁷ for the conventional

⁶ H. C. Brookfield (1952) *Worthing: The Plans Rev* 23, 145-62

⁷ For by far the best and most amusing comments on these changes in style see

O. Lancaster (1959) *Here of all places* (London)

⁸ See pages 258-62 of this chapter

analysis of residential areas has been by age of building. Even this approach is seldom retained as such and most studies soon resolve themselves into a consideration of the historical growth of the city and the identification of characteristic areas in the conventional 'growth plan', and only occasionally in the more complex 'age of buildings' map. Whilst these are necessary adjuncts to general studies they are not very incisive methods for the study of the urban house. Indeed while a large number of studies have dealt with rural or regional house types few have ventured into the intricate detail of the city. It is true that most maps of city growth include structural elements. Thus one is familiar with maps having areas labelled, 'early nineteenth century terraced housing' or, 'inter-war semi-detached housing', where an approximate date is linked with the grossest of structural descriptions. R. E. Dickinson reproduces the types of housing recognized in the County of London Plan as being applicable to the whole of England.⁹ The categories identified are

- 1 Old cottages which formed part of the pre nineteenth century villages and pre by-law housing of the two storey terrace type
- 2 Relatively large houses of three storeys plus basement built 50 to 80 years ago
- 3 Buildings originally used as stable and coach accommodation attached to large houses, now used as dwellings (mews houses)
- 4 Isolated or detached villas in the suburbs with large gardens and spacious layout
- 5 Two storey and three story houses built 50 to 60 years ago and covering large areas. By-law housing
- 6 Tall tenement blocks erected between 1875 and 1920
- 7 Spacious and dignified terraces and squares of the seventeenth and eighteenth centuries

This is not a very impressive categorization but it is sufficient to indicate the method.¹⁰ With a scheme of this order established the investigator proceeds to map the city by observation and divide it into broad areas (figure 11-1A). In extension of this Smailes has called for 'special maps that depict the town not only in terms of functional land-use, but also of the building forms and materials that contribute much both to the general appearance of the town and to the distinctiveness of its general parts, the urban regions'¹⁰ (figure 11-1B). He

⁹ R. E. Dickinson (1951) *The west European city* 502 (London)

¹⁰ For a general discussion of townscapes by a geographer see E. Johns (1965) *British townscapes* (London)

¹⁰ A. E. Smailes (1955) Some reflections on the geographical description and analysis of townscapes *Trans Inst Br Geogr* 21, 161

himself has suggested a classification which for Britain would identify in structural terms the following

- 1 Residential hotels and boarding houses
- 2 Blocks of flats or apartments
- 3 Terrace houses with front gardens
- 4 Terrace houses without front gardens
- 5 Detached or semi-detached villas and bungalow residences with garages or adequate garage space at the side
- 6 As 5 but without garages or garage space
- 7 Large detached houses in extensive grounds¹¹

In addition he commends a mode of mapping and analysis which includes date and building and roofing material so that an entry reads, 'A large three storeyed early Victorian detached house in extensive grounds, that has now been converted into apartments it is built of stone with a slate roof'¹² This would presumably correspond to the second of the categories of the County of London Plan.

This same problem has been considered with admirable attention to detail by R. J. Solomon in a study of Hobart, Tasmania. The theme is clearly that of A. E. Smailes: 'We must learn to recognize the architectural elements and constructional materials which in combination comprise an authentic fabric of particular style and period. They become the diagnostic agents in the process of analysis and classification, any significant alteration to their basic characteristics is reflected in the structural entity of the building unit, and its impact may be assessable.'¹³ Solomon follows this by a study of Hobart in which the present townscape is examined in terms of extant and modified buildings which existed at the time of survey and could be identified on an 1840 map (figure 11-2). This is essentially a process of carefully identifying relict elements in the present townscape,¹⁴ and by virtue of its nature all elements are relict in one sense.

But as soon as buildings are described in the way proposed by Smailes or indeed as suggested by Solomon then the real nature of the problem appears. It is clearly a multivariate problem with no one variable being dependent, and some form of factor analysis which

¹¹ A. F. Smailes (1964) *Urban survey* in J. T. Coppock and H. C. Prince, editors, 1964 *The geography of greater London* 210 (London).

¹² A. E. Smailes (1964).

¹³ R. J. Solomon (1966) *Procedures in townscape analysis* *Ann Assoc Am Geogr* 56, 255.

¹⁴ J. W. Watson (1959) *Relict geography in an urban community*, in R. Miller and J. W. Watson, editors (1959) *Geographical essays in memory of A. G. Ogilvie* 110 (Edinburgh).

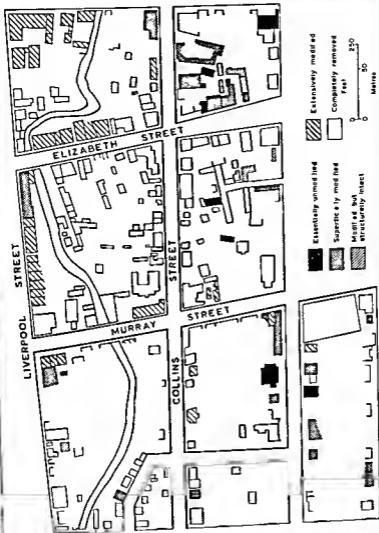


Figure 11-2: Relict buildings in Hobart, Tasmania After R J Solomon (1966) This map which is a portion of the original, shows the buildings of the 1840s and their degree of preservation in the townscape of 1962-3

would isolate components of the complexity, or of association analysis which would isolate the key criteria of variation, are required

As yet there is very little literature in which these methods are employed but studies are beginning to be made. Kenneth E. Corey has been attempting work of this nature in Cincinnati, Ohio. 'It is proposed', he writes, 'that the major dimensions of variability and the major dimensions of classification of an example of urban housing be isolated by means of principal component analysis and discriminant analysis respectively'.¹⁵ Corey takes a twenty block area in an older residential neighbourhood of Cincinnati (Corryville) which contains 247 houses and based upon preliminary survey 40 variables are used. The first thirty-three of these are attributes, the last seven interval scale values where a critical point has to be chosen. These variables are reproduced below in table 11-1.

table 11-1. Variables used in a study of housing in part of Cincinnati

1	Classification	Single	20	Roof	Flat
2		Double	21		Pitched
3		Duplex	22		Compound
4	Construction	Frame	23		Metal
5		Brick	24		Asphalt
6		Stone	25		Wood shingle
7		Stucco	26		Asphalt
8	Foundation	Concrete			shingle
9		Cement block	27		Slate
10		Stone	28		Tile
11	Walls	Siding	29	Porch	Covered
12		Shingle	30		Uncovered
13		Wood	31		Enclosed
14		Asphalt	32		Wood
15		Asbestos	33		Masonry
16		Stucco frame	34	Year built	
17		Stucco	35	Age	
		masonry	36	Building length	
18		Common	37	Building width	
		brick	38	Building area	
19		Face brick	39	Total building value	
			40	Total assessed value	

It is worth noting that this list would be easily adapted for most western countries with only minor modifications such as the amendment of the ubiquitous American porch: certainly it is close to the

¹⁵ K. E. Corey (1966-7) *Urban house types: a methodological experiment in urban settlement geography*. Dept Geogr Univ Cincinnati Disc. Pap. 3 (1966), appendix III (1967), page 45. See also K. E. Corey (1963) *A spatial analysis of urban houses*. Univ. of Cincinnati, unpub. Ph.D. dissertation.

lists of features which have been used in Britain¹⁶ The analysis revealed that 53 per cent of the variability was accounted for by the first six components, the first two accounting for 15.89 and 12.02 or 27.91 per cent of the total variation The loading of each variable on the first factor is shown in table 11-2

table 11-2. Adjusted factor loadings on the variables shown in table 11.1

Variable	Factor 1 Loading
4	0.394
5	-0.415
8	0.826
9	0.484
10	-0.827
12	0.341
16	0.391
18	-0.618
20	-0.534
21	0.538
23	-0.582
24	0.479
25	0.339
26	0.331
34	0.816
35	-0.815
36	-0.876
37	0.424

Note: All loadings lying between +0.30 and -0.30 have been omitted
For description of variables see table 11.1

As with all component analyses the real problem is the interpretation of the components and in a complex situation such as this it is particularly problematical Corey suggests that the first component can be identified as a dimension of 'rather youthful houses constructed of relatively inexpensive materials The houses of this dimension are wide, with pitched roofs characterized by recent date of construction, concrete and cement block foundation, roof materials of asphalt, wood shingle and asphalt shingle, and general construction and walls of frame stucco and asphalt The negative scores reinforce the inexpensive building dimension by denoting lack of the more expensive materials—stone and brick, and building length Empirical correlation suggests a "California bungalow" type of house¹⁷ The next stage in

¹⁶ H. S. Thurston (1953) The urban regions of St Albans. *Trans Inst Br Geogr* 19, 107-21

¹⁷ K. E. Corey (1966-7), 47

this work would be to examine each house in relation to factor scores and from these to derive a regionalization of house types. This ends at the same stage as the more empirical methods already described and interpretation must be undertaken in relation to the growth of the city and all those forces of fashion and cost which control building style. But the regional pattern has now been objectively derived in so far as selected variables permit this. The problems of employing a method of this sort are very great. The information Corey used, limited to 247 houses, was available from a central source (the real property assessment files of the Auditor of Hamilton County, Ohio), to obtain this information for the whole housing stock of a large city presents a very formidable task of data collection. One has also to question whether this statistical process will justify itself by results, for there seems little doubt that the types of house identified and the regions described will accord fairly closely to those of the empirical investigator basing his work on experience. But this is a valid and useful area of experiment that might add a very desirable element of precision to the rather vague categories which have been employed in the past.

The same sort of problem has been approached in a different manner by C. A. Forster in a study of the development of physical characteristics in by law housing in Hull.¹⁸ This type of housing was built between 1854 and 1914 and from it Forster selects one special sort, the cul-de-sac court. A total of 1479 of these was identified in the whole of the city. Thirteen variables were listed from inspection (table 11-3). Ten of these were concerned with the general configuration of the houses and three with building materials. In the list it is worth

table 11-3 List of variables By law housing in Hull

Rear access to house
Stub carriage road
Double fronted house
Three floors
Front garden
Red brick
Slate roof
Ornamented brick
Tunnel entrance to cul de sac
Bay window
Double bay window
Garret
End house in terrace faces street

¹⁸ C. A. Forster (1968) The development of by law housing in Kingston-upon-Hull: an example of multivariate morphological analysis. *Inst Br Geogr Urban Study Group Salford conference* 115-31.

noting that the absence of one variable implies the presence of another. Thus all the houses without slate roofs had pantiles. In this way the list is restricted. To these were added two variables of dimension which were not basically dichotomous. Critical values were selected by assessment to give

cul-de-sac courts over 100 feet long and
cul-de-sac courts over 20 feet wide

1479 cul-de sac courts were then surveyed to show the presence or absence of the fifteen variables. A form of association analysis (multiple chi square analysis) is used in a process of dichotomous division of the courts. Caroe has described association analysis, 'At each stage in the analysis the collection of individuals under consideration is divided with respect to a single attribute so that in the resulting two sub-groups this attribute is possessed by all members of one and lacked by all members of the other'.¹⁹ This process is continued until a point is reached where the maximum association between variables in the undivided classes is not significant at the 0.01 confidence level. The process is shown in figure 11.3. Each of the final groups can be described by the critical dividing attributes so that Type B, the most common, can be summarized as

Cul-de sac terrace over 20 feet wide
Lower bay window
Less than 100 feet long
The end houses face the street
Red brick

Although the data are derived from groups of houses, the courts and not single houses as was Corey's, the end product is the same: the identification of dominant and recurrent types. Forster carries his analysis forward on a chronological rather than a regional basis. An examination of a 25 per cent sample of plans is undertaken and the number of houses built per year is divided into the morphological groups A to V (figure 11.4) which have been identified. The result is a clear chronology of change. 'The major morphological developments in the cul-de-sac terrace by 1893 can be summarized as the transition from local to national building materials which became almost completed by the late 1880s, the provision of rear access to houses by 1878 and the widening of the courtyard and the provision of lower bay

¹⁹ L. Caroe (1968) A multivariate grouping scheme: association analysis of East Anglian towns, chapter 16 in E. G. Bowen, H. Carter and J. A. Taylor (editors) (1968) *Geography at Aberystwyth*, 253-69 (Cardiff)

MULTI-GROUPING OF TERRACES BY ASSOCIATION ANALYSIS

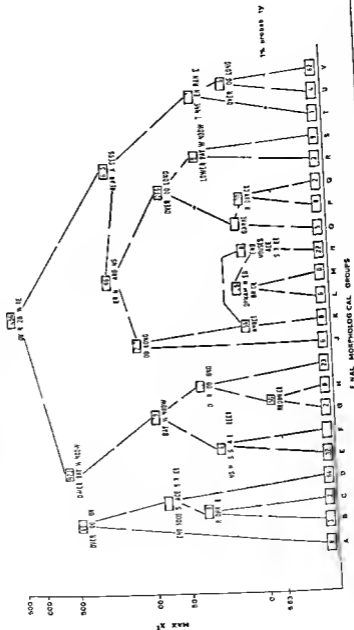


Figure 11-3 Grouping of cul de sac by law terraces in Hull by association analysis. The progressive breakdown into the final morphological groups is indicated as well as the critical feature in each case. *After C. A. Forster (1968)*

HILL AGE RANGES OF MORPHOLOGICAL GROUPS (from 25 % sample of by-law plans)

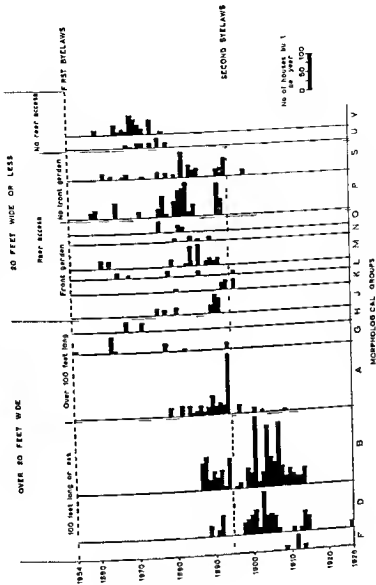


Figure 11-4: The age ranges of the morphological groups of by-law terraces. This is a diagram based on a 25 per cent sample and indicates the time range over which the various groups identified in figure 11-3 were built. After C. A. Forster (1968)

windows and front gardens in the 1880s and 1890s.²⁰ But in 1893 a new set of by-laws came into being rendering all but Groups B and D (figure 11-3) illegal. Type F appeared in 1908 with bay windows on both upper and lower floors and these houses were solid and spacious and, in purely structural terms, remain adequate today. Again there is no doubt that a meticulous historical study without recourse to statistical analyses would have revealed the same features but Forster's study is most valuable in indicating another method of approaching the study of house types which has clear direction and precision.

The two studies which have been sketched are preliminary examples of work which is likely to increase in scale as the application of new analytical techniques to old problems proceeds. The clear sorting of innovations in building characteristics in a historical sense, together with studies of their diffusion, coupled with the objective identification of regional groups from component analysis must certainly provide much sharper tools for the job of understanding the way townscapes are created.

To some extent this section under the heading of 'structures' has diverted attention away from the concept of land-use of which residential areas are part. But it is important that one of the oldest concerns of the urban geographer, indeed one which at one time was thought to be the concern since it dealt with the visible landscape, should not be abandoned. 'I believe that the primary concern of cultural geography is with the nature, genesis and distribution of the observable phenomena of the landscape directly and indirectly ascribable to man, and of course including man himself. By "observable" I mean in general "visible".'²¹ That is a view to which few now would subscribe without qualification, but there has been a tendency to abandon too completely the old emphasis on the visible phenomena in the rush to advance the more fashionable study of social areas.

2 SOCIAL CHARACTERISTICS OF RESIDENTIAL AREAS

The zones and sectors which were identified by the Chicago ecologists were presented in social terms and it is, therefore, with such terms that the bulk of investigation of residential areas has been concerned. The first stage was the empirical testing of hypotheses which followed from the ecological models. These hypotheses were that populations are segregated residentially by social class and, that since social distance can be translated into physical distance, then observable patterns of

²⁰ C. A. Forster (1968), 129. See also, C. A. Forster (1972) Court housing in Kingston upon Hull, *Univ. of Hull, Occ. paps* 19.

²¹ F. Kniffen (1957) in S. D. Dodge, chairman (1957) Round table on problems in cultural geography *Ann Assoc. Am. Geogr.* 27, 155-76.

residential segregation in spatial terms can be discerned within the city. The classical model implied that social class increased with distance from the city centre, but this was hardly tenable even within America.

In these hypotheses the concept of 'social class' is a little vague and for most operational purposes it has been equated with 'occupation' which is the most easily accessible parameter. 'Occupation' is only one of the criteria of social stratification, however. Its significance is clearly twofold because it relates to an economic relationship with the means of production but also defines a work-situation which will in turn have consequences on both the consciousness of class identity and also will help to define patterns of status estimation and attitude to the stratification system both within and outside the work situation.²² The major testing of the first of the above hypotheses, using occupation as a measure of social class, was that by O. D. and B. Duncan.²³ They used two basic measures. The first is the index of dissimilarity

$$\sum_{i=1}^n \frac{(x_i/\sum x_i) - (y_i/\sum y_i)}{2} \cdot 100$$

Where x_i represents one occupation and y_i represents another occupation residing in zone i . Essentially it measures the percentage of an occupational group (x) which would have to move to make its distribution identical with another occupational group (y). If this is computed between one occupational group and all others combined it gives the second measure, an index of segregation. Table 11-4 indicates

table 11-4: Index of residential segregation of each major occupation group employed males Chicago 1950 After O. D. and B. Duncan (1955)

Occupation group	By census tract	By zone sector segments
		21
1 Professional technical and kindred workers	30	20
2 Managers officials and proprietors except farm	29	20
3 Sales workers	29	9
4 Clerical and kindred workers	13	14
5 Craftsmen foremen and kindred workers	19	16
6 Operatives and kindred workers	22	20
7 Service workers except private households	24	29
8 Labourers except farm and mine	35	

²² J. A. Jackson (1968) *Social stratification* 3 (Cambridge)

²³ O. D. and B. Duncan (1955) Residential distribution and occupational stratification *Am. J. Sociol.* 60, 493-503

the index of residential segregation for each major occupation group, for employed males, in Chicago in 1950

From this the Duncans argue there is a *U* shape pattern of indices of segregation. With high values at the top and bottom of the social scale, professional workers and managers and service workers and labourers, but with low values in the intermediate occupations where status is less clearly marked—'residential segregation is greater for those occupational groups with clearly defined status than for those groups whose status is ambiguous'.²⁴ Table 11.5 reproduces the indices of dissimilarity in residential distribution and from this the Duncans conclude that there is an 'essential correspondence of social and spatial distance among occupation groups'. The result of their study was to demonstrate that segregation in residential terms does exist and that the most segregated occupation groups are those at the extremes of the socio-economic scale.

table 11-5 Indices of dissimilarity in residential distribution for major occupational groups employed males Chicago 1950 After O. D. and B. Duncan (1955)

The groups are numbered as in table 11-4

	1	2	3	4	5	6	7	8
1		13	15	28	35	44	41	54
2	8	—	13	28	33	41	40	52
3	11	7	—	27	35	42	39	54
4	20	18	17	—	16	21	24	38
5	26	23	25	12	—	17	35	35
6	31	29	30	16	14	—	26	25
7	31	31	30	19	25	19	—	28
8	42	41	42	32	30	21	24	—

Note Above diagonal the indices are by census tract below diagonal by a zone sector arrangement. The index is explained in the text.

It also shows that this segregation, in terms of social distance, is paralleled by a spatial segregation, in terms of physical or locational difference. A further study by J. O. Wheeler using Pittsburgh data confirms these conclusions from the Chicago study corroborating 'the generalizations of other researchers that the most segregated occupations are those at the highest and lowest ends of the socio-economic scale. Furthermore, occupations that are most alike in residential location are also similar in socio-economic rank, those with the greatest

²⁴ O. D. and B. Duncan (1955)

locational differences represent the extremes of status level.²⁵ But this evidence only goes part of the way toward a spatial interpretation for even if segregation is accepted and social distance is translated in the city as a spatial entity, into physical distance these do not carry any implication of *relative* location within the city. Here the evidence becomes less clear. The Duneans' material is thin and can carry no real conviction while Wheeler concludes that his study finds little relationship between the relative concentration of an occupational group's residence and distance from the central business district.²⁶ Certainly there is general confirmation of 'the centralization of residence being inversely related to socio-economic status'.²⁷ A study by Kain using data from Detroit has postulated and demonstrated that if households had the same location rent function, the same transportation cost function, the same space preference and the same valuation of time but different in comes the length of the households' journey to work would increase as an increasing function of income.²⁸ Again in his conclusions Kain writes 'workers employed in higher income occupations and working in inner rings (distance rings from the centre) tended to make longer journeys-to-work and resided in outer rings. When employed in outer rings they made shorter journeys to-work and lived within the same ring and adjacent rings at very high rates. Lower income workers made short journeys to-work and resided within the workplace ring and in nearby rings regardless of the place of work'.²⁹ This is only in small part a confirmation of a zonal pattern of residential segregation indeed the latter part of the quotation does not conform to the zonal model. There is a considerable danger that the multiplication of studies such as these provides no more than a series of exercises derived from and more importantly, limited by the context of the ecological models or the abstractions of the land economists. Use of the single variable of occupation means that they fail to take into account the great variability within residential areas. This failure was to be compensated in the attempt to increase the range of variables which are to be taken as diagnostic of distinctive social areas.

The immediate stimulus to derive acceptable social areas came from the need to provide 'community areas' for a study of Los Angeles as well as from the awareness that one variable was an inadequate means of approaching a complex problem. It followed that the first departure was via the attempt to build up a more satisfactory and *ipso facto*

²⁵ J. O. Wheeler (1968) *Residential location by occupational status* *Urban Stud.* 5
24

²⁶ J. O. Wheeler (1968)

²⁷ O. D. and B. Duncan (1955) 502

²⁸ J. F. Kain (1962) *The journey to work as a determinant of residential location* *Pap. Proc. Reg. Sci. Assoc.* 9 147

²⁹ J. F. Kain (1962)

table 11-6. Social area analysis steps in construct formation and index construction After E Shvky and W Bell (1955)

Postulates concerning industrial society (aspects of increasing scale) (1)	Statistics of trends (2)	Changes in the structure of a given social system (3)	Constructs (4)	Sample statistics (related to the constructs) (5)	Derived Measures (from col 5) (6)
Change in the range and intensity of relations	Changing distribution of skills Lessening importance of manual productive operations—growing importance of clerical supervisory management operations	Changes in the arrangement of occupations based on function	Social Rank (economic status)	Years of schooling Employment status Class of worker Major occupation group Value of home Rent by dwelling unit Plumbing and repairs Persons per room Heating and refrigeration	Occupation Schooling Rent Index I
Differentiation of function	Changing structure of productive activity Lessening importance of primary production—growing importance of relations centered in cities—lessening importance of the household as economic unit	Changes in the ways of living—movement of women into urban occupations—spread of all-annual farm patterns	Urbanization (family status)	Age and sex Owner of tenant House structure Persons in household	Fertility Women at work Single family dwelling units Index II
Complexity of organization	Changing composition of population Increasing movement—alterations in age and sex distribution—increasing diversity	Redistribution in space—changes in the proportion of support and dependent population—population isolation and segregation of groups	Segregation (ethnic status)	Race and nativity Country of birth Citizenship	Racial and national groups in relative isolation Index III

more complex means of classifying basic census units into homogeneous social areas. The early statement of Shevky and Williams³⁰ in their study of Los Angeles in 1949 was followed by a volume by Shevky and Bell, *Social Area Analysis*, in 1955 in which an attempt was made to put the study on a broader basis.³¹ The basic principle on which the key variables were selected is contained in the sentence, 'we conceive of the city as a product of the complex whole of modern society, thus the social forms of urban life are to be understood within the context of the changing character of the larger containing society'.³² From this three aspects were isolated epitomizing this changing character. These were:

- 1 Change in the range and intensity of relations
- 2 Differentiation of functions
- 3 Complexity of organization

Via the arguments which are set out in table 11-6 these were translated into three constructs which were identified as social rank (economic status), urbanization (family status) and segregation (ethnic status). These were measured for statistical purposes by the data indicated in table 11-7 to provide the three indices.

table 11-7: Indices used in social area analysis *After E. Shevky and W. Bell (1955)*

Index 1 Social Rank

- A Occupation ratio Total number of craftsmen, operatives and labourers per 1000 employed persons
- B Education ratio Number of persons who have completed no more than grade school per 1000 persons 25 years old and over
- C Rent - omitted from the list.

Index 2 Urbanization

- A Fertility ratio Number of children under 5 years per 1000 females age 15 through 44
- B Women in labour force The number of females in the labour force per 1000 females 14 years and over
- C Single family detached dwelling units ratio The number of single family dwelling units per 1000 dwelling units of all types

Index 3 Segregation

The number of persons designated negro, other races and foreign born white, the last from south and east Europe. Shevky and Bell give a list of the countries. The sum of these is divided by the population of each tract and multiplied by 100 to give the index.

³⁰ E. Shevky and M. Williams (1949) *The social areas of Los Angeles, analysis and typology* (Berkeley and Los Angeles)

³¹ E. Shevky and W. Bell (1955) *Social area analysis, theory, illustrative application and computational procedure* (Stanford)

³² E. Shevky and W. Bell (1955)

Implicit in this whole process, as indeed the authors propose, is the assumption that the selected indices relate to the observed social differentiation between urban sub-populations, and at the same time they are unidimensional, that is, that they do not include similar aspects within them and therefore repeat the same measure three times. This point will be considered later. In order to classify areas the index of urbanization was plotted against that of social rank as a base divided equally into three. Urbanization was also divided into three intervals,

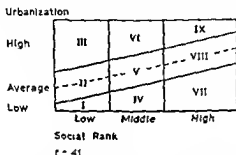


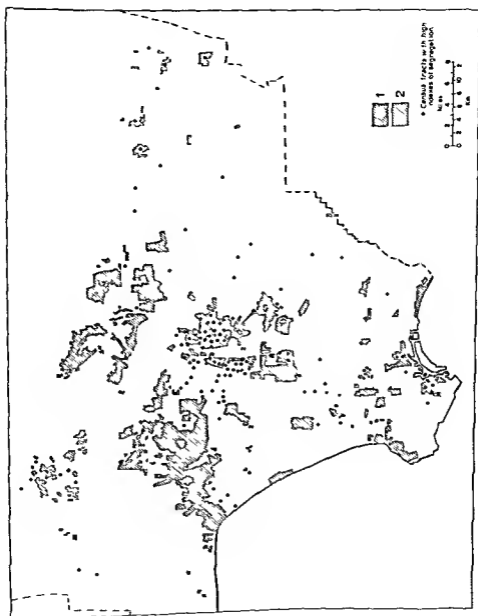
Figure 11-5. The derivation of social areas. After E Shevky and M Williams (1949). The criteria used are indicated in the text. Urbanization is plotted against social rank which is divided into three. The regression of urbanization on social rank is plotted and divisions drawn one standard error away. This gives nine divisions.

'with the middle or average interval determined by the space of two standard errors about the regression line of urbanization related to social rank' (figure 11-5). Segregation was added to this basic classification by high and low categories related to the mean figure.

Figure 11-6 shows a part illustration of the map of social areas of

²² E. Shevky and M. Williams (1949).

Figure 11-6 The social areas of Los Angeles. 1 census tracts with high social rank and average and low urbanization (i.e. categories VII and VIII on figure 11-5). 2 census tracts with low social rank and average and high urbanization (i.e. categories I and III on figure 11-5). This is a simplified extract from the original coloured map but the major contrasts appear particularly in the area of high quality residence extending from the coast at Santa Monica through Beverly Hills to Hollywood. Derived from E. Shevky and M. Williams (1949).



Los Angeles produced by Shevky and Williams using 1940 data. The wedge of high social rank and average or low urbanization picks out one of the best known areas of Los Angeles, swinging from the Pacific Ocean at Santa Monica along Sunset and Wilshire to Beverly Hills. To the east the suburban areas of Glendale and Pasadena also emerge quite clearly, although here a low index of urbanization reflects the suburban character of those parts.

The work of Shevky and his associates has been the subject of a great deal of criticism. It has been urged that it has no theoretical background and is merely an attempt to delineate areas for their own sake, a view as already noted not unfamiliar in regional geography or attempts to define the CBD. To some extent this limitation is not surprising, especially in the light of the many expressions of dissatisfaction with the existing ecological models and the need for empirical work upon which reformulation could be based. What theoretical background there was can be discerned if the way in which Shevky derived his constructs is examined in relation to the characteristics of the urbanization process as set out in chapter 2. The dominance of Wirth's ideas becomes evident and the parameters which Shevky selected were intended to examine in small scale areas the changes which were taking place in society at large as urbanization increased. There are immediate problems in this transfer of scales and to the extent that Wirth's ideas themselves are not accepted the whole conceptual basis of social area analysis in this context is undermined.

If the whole notion of the constructs is open to question so, too, is the selection of the statistical measures. For example, in most subsequent studies rental has been eliminated from the measure of social rank. 'In considering the whole range of possible parameters which might be selected as measures of aspects of urban social structure one might, therefore, have even graver doubts as to the validity of isolating those few indices which Shevky suggested'.²⁴

The third line of criticism relates to the unidimensional nature of the indices which was noted earlier, that is whether the three are discrete and unrelated to each other and not, in fact, overlapping measures of the same thing. Thus it can be shown that fertility is closely associated with occupation and education and hence has a significant linkage with social rank and does not stand outside it as a measure of that most nebulous construct which Shevky called 'urbanization'.

It will be apparent that a very familiar problem is raised, precisely the same one as in urban house styles and that is how to collapse a

²⁴ B. T. Robson (1969) *Urban analysis* 52 (Cambridge)

- 1 *The components of social variation* Murdie has produced a table of the components which have been identified from a number of analyses, mainly of American cities³⁷ In nearly all these cases three are outstanding, and usually make up the first three extracted They are economic status, family status and ethnic status To these two more recent British studies can be added where the components identified are social class, housing conditions and subdivided housing losing value in the first³⁸ and housing condition, ethnic status and family status in the second³⁹ There is a fairly clear element of agreement in all these studies, although the British evidence emphasizes housing conditions rather than economic and social status The components which emerge are, therefore, closely allied to those constructs proposed by Shevky and Bell⁴⁰ The rather vague 'urbanization' construct is, however, reinterpreted as a measure of 'family status' or family characteristics This gives three basic components which play a part in urban social variation and since by the nature of their abstraction they cannot be overlapping, then it is possible to look at the next problem which is how are these distributed within the city and so bring the consideration back to the basic geographic concern of spatial variation
- 2 *The spatial articulation of the components of social variation* Once again it is true to contend that most studies which have been concerned with the spatial characteristics of identified components have not propounded any new theory of city structure, but have examined the results in relation to the earlier ecological models To a large extent these studies have been placed in the context of zonal as against sectoral characteristics of distribution The terms 'zonal' and 'sectoral' are to some extent pejorative and the real crux is whether the locational character of the component is controlled by distance or directional forces in relation to the city centre

The two aspects of social area analysis, component content and spatial articulation were the subject of a study by Anderson and Egeland⁴¹ They selected four American cities, Akron and Dayton in

³⁷ R. A. Murdie (1969) *Factorial ecology of metropolitan Toronto, 1951-61* *Univ Chicago Dept Geogr Res Pap* 116 (Chicago) table 3 pages 52-8

³⁸ B. T. Robson (1969) 162-4

³⁹ D. T. Herbert (1970) *Principal component analysis and urban social structure a study of Cardiff and Swansea* chapter 5 in H. Carter W. K. D. Davies and C. R. Lewis (eds) (1970) *Studies in the geography of Wales* (London)

⁴⁰ See also M. D. Van Ardsol S. F. Camilleri and C. F. Schmid (1968) The generality of urban social area indexes *Am sociol Rev* 23, 277-84

⁴¹ T. R. Anderson and J. A. Egeland (1961) *Spatial aspects of social area analysis* *Am sociol Rev* 26, 397-8

Ohio, Indianapolis in Indiana, and Syracuse, New York, which were roughly comparable in size and circular in shape. Variance analysis was used to test two measurements urbanization and social prestige, by distance zones and by sectors. The principal findings of the study were 'that urbanization varies primarily concentrically or by distance from the centre of the city, while prestige value (or social rank) varies primarily sectorially with very little distance variation'⁴² This conclusion would support Hoyt's sector hypothesis as far as social rank is concerned, that is there is no basic distance pattern whereby the prestigious residential areas of a city are found in an outer surrounding zone. The basic reasons which Hoyt put forward for this sectoral development have already been outlined.⁴³ They can be effectively summarized 'High status residents have great freedom in choosing the origin for the sector, usually selecting the most attractive area topographically which is closest to their work places in the office quarter of the central business district and near to the residences of the community's leaders. Once this has been chosen however, other status groups distribute themselves around it so that the high status area becomes the pivot of the city's residential structure'⁴⁴ As the high status area is tied to this base by its inherited tradition it expands outward as a sector along a main artery of communication.

The sorts of factors involved in this process have been clearly depicted in a study of Melbourne by R. J. Johnston.⁴⁵ Using as a definition of high social status residents' inclusion in *Who's Who in Australia* he has traced the development of the prestigious residential areas over a hundred years. Figure 11-7 summarizes the evidence for the last half-century. Residential development by the high status group has been separated into two parts and is traced by calculation of the mean centre of gravity and the mean distances of deviation which indicate the degree of dispersion about the centre.⁴⁶ The map shows a southern sector where the centre of gravity had moved five miles between 1913 and 1962 from its original emplacement in St Kilda on the coast and four miles south of the city centre. In the other eastern sector of Toorak movement had not been as marked or as direct only covering two miles from its original source. It was also a tighter and more compact sector with a smaller mean distance of deviation. In explanation of these sectors and the differences between them Johnston

⁴² T. R. Anderson and J. A. Egeland (1961) 398.

⁴³ See chapter 9 page 184.

⁴⁴ R. J. Johnston (1966) 'The location of high status residential areas' *Geogr. Annaler* 48B 25 (Stockholm).

⁴⁵ R. J. Johnston (1966).

⁴⁶ See J. F. Hart (1954) 'Central tendency in areal distribution', *Econ. Geogr.* 30 48-59.

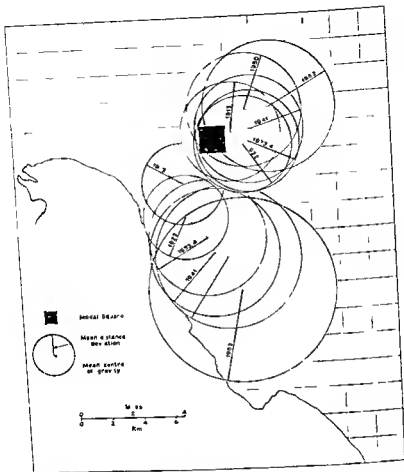


Figure 11-7: The development of the high prestige residential areas of Melbourne, 1860–1960 After R J Johnston (1966) The circles represent the mean deviation of the distance at which high status persons live from the centre of gravity of the distribution These were computed separately for the eastern and southern sectors The basic definition of 'high status' was the home addresses of those Melbourne persons recorded in 'Who's Who in Australia'

adds to the sector interpretation of Hoyt the socio-cultural variables which Firey introduced.⁴⁷ Toorak, he argues, has not expanded physically because of the larger mansions with extensive estates which on subdivision allowed intensification rather than expansion when demand for space arose since the area had long been 'the peak of residential aspirations'.⁴⁸ Individual and institutional restraints have been operative in the preservation of the area's character. This brief study indicates that the detailed mode of extension of high status residential areas does conform to Hoyt's sectoral interpretation and where a class dimension is revealed in social area analysis it conforms to the same spatial arrangement. Prestige, too, is a self-perpetuating influence and generates an element of stability in the location of high status areas which are often tied to their points of origin.

The second component which many analyses have revealed is the one Shevky and Bell termed 'urbanization' but which is usually renamed 'family status' to give it a clear connotation and detach it from wider implications. According to Anderson and Egeland⁴⁹ it does not conform to the location pattern of social status groups and most other investigators agree.⁵⁰ Perhaps the most convincing study is that of Toronto by R. A. Murdie in which not only was a component analysis carried out for 1901 and 1961 using 86 and 78 variables respectively, but change during the decade was also analysed. Murdie concludes, 'the economic status dimension moved outwards in a general sectoral arrangement with the wedges of high and low status widening towards the periphery of the metropolitan area'. The family status dimension tended to move outwards from the city centre in a concentric fashion.⁵¹ Family status in this context is defined by a factor characterized by large, young families, few women working outside the home, single family dwellings and high car and home ownership at one end and the converse at the other. For this situation there is a contrasting set of explanations to those for the social class factor. This lies generally in the different needs of the family at different stages in the cycle of development. Alonso remarks on this in recording the increase of apartment construction in the USA. 'We have mentioned

⁴⁷ See chapter 9, pages 190-91.

⁴⁸ R. J. Johnston (1966), 33. For a further study see R. K. Middleton (1966) *Measuring intra urban residential quality: a method for determining residential morphology* *Prof Geogr* 18, 352.

⁴⁹ J. R. Anderson and J. R. Egeland (1961).

⁵⁰ B. J. L. Berry and R. J. Tennant (1965) *Metropolitan planning guidelines Comm'l Struct* (Chicago). P. O. Pedersen (1967) *An empirical model of urban population structure: a factor analytical study of the population structure in Copenhagen*. *Proc First Scandinavian-Polish Reg Sci Seminar Warsaw*.

⁵¹ R. A. Murdie (1969), 142-4.

the convection-flow life cycle of the American middle class family. The young and the old need apartments while it is those in their thirties that power the demand for single family homes.⁶² The implication is that the young adult will seek an apartment near the city centre and will only look for the more spacious single family house with its garden or yard when he is married and has a family. As the family leaves home then there is considerable attraction in a more easily managed apartment near the city centre. The individual, therefore, in the context of his life cycle moves across the city setting up the distance-to-centre/family relationship which is revealed by these analyses. The whole crux of the matter was summarized by one brought up in a city—'houses are for kids, apartments are for adults.' Robson provides a more elegant version, 'Whether a family chooses to live in the inner or the peripheral parts of a town can therefore be determined by its assessments of the importance of land inputs as against commuting inputs and the balance of this equation of family budgeting will change depending on which stage of its life cycle the family is in as much as upon its income level.'⁶³ There is an increasing array of empirical evidence to support this view derived as it is from a generalized level of investigation. Rossi from a series of intensive interviews and follow up studies concluded, 'the major function of mobility [is] the process by which families adjust their housing to the housing needs that are generated by the shifts in family composition that accompany life cycle changes.'⁶⁴

The conclusion from these studies is that the two major controls on the decision where to live in a city are socio-economic status, including both the ability to pay rates and rents, the picture the individual has of himself and the sort of social group into which he wishes to opt, and life cycle 'status' where the family's needs exercise a strong influence. Both of these operate through a nexus of institutional and cultural constraints.

The third component of social variation in cities which was isolated by Shevky and has been confirmed by many component analyses is 'ethnicity' or ethnic status. This was called by Shevky, segregation or the group phenomenon of isolation. It is concerned with the degree to which cultural and racial groups become separated in the city and hence with the urban ghetto. It was appropriate that a study of the ghetto emerged from the Chicago ecologists and Wirth's book, entitled *The ghetto*,⁶⁵ treated it as a phenomenon within the context of human ecology. The ghetto was 'not the product of design but rather the

⁶² W. Alonso (1964), 230.

⁶³ B. T. Robson (1969), 243.

⁶⁴ P. H. Rossi (1955) *Why families move*, 9 (Glencoe, Ill.)

⁶⁵ L. Wirth (1956) *The ghetto*.

unwitting crystallization of needs and practices rooted in the customs and heritages religious and secular, of the Jews themselves.⁵⁶ Jews drifted into separate cultural areas not due to external pressures but largely through the desire to associate in an area where religious observances could be followed without arousing alarm and also for security. 'The voluntary segregation of the Jews in ghettos had much in common with the segregation of negroes and immigrants in modern cities. The tolerance that strange ways of living need and find in immigrant colonies, in Latin quarters... is a powerful factor in the sifting of the population and its allocation in separate cultural areas.'

⁵⁷ This is, however, too simple an identification and certainly two types of ghetto can be recognized which play diametrically opposite roles.

- 1 *The temporary ghetto* This is a segregated area through which populations become adjusted to new ways of life. In particular immigrants to a country or a city find immediate refuge with people of their own kind until they have adjusted to urban living in a country and, with a rise in their socio-economic status and acquisition of native mores, they become diffused through the population. This process can act for native rural immigrants (the slum) or culturally alien elements (the ghetto). This is the traditional function of the ethnic area in American cities. As acculturation progresses, the family moves out, loses its ethnic character and becomes part of urban America.
- 2 *The permanent ghetto* This is, perhaps, contrasted in degree rather than in nature, but it is the means by which a cultural group can actively resist being weakened and lost in the larger community of which it is a part. In this case it is not part of a process of assimilation but quite the reverse, the means by which assimilation can be resisted and identity preserved.

At the moment the black in the USA is in the dilemma of not knowing in which of these two ways to regard the ghetto, as a temporary phase which will see him become diffused throughout and integrated with American society or as a permanent feature which will enable him to develop his own way of life, opting out of the value system of white, middle-class America. If the latter course is taken the problem then becomes one not of dissolving the ghetto but rather of emphasizing it and obtaining a fair share of community investment. This could lead to an ironic reversal to the 'separate but equal' principle of the pre anti-segregation legislation and to apartheid. To a large extent

⁵⁶ L. Wirth (1956), 18

⁵⁷ L. Wirth (1956), 20

the difficulties of the blacks in the USA are derived from the fact that instead of being the temporary feature it has been for almost all other immigrant groups the ghetto became permanent whether the blacks wanted it that way or not. 'The early pattern of negro settlement within each metropolitan area followed that of immigrant groups. Migrants converged on the older sections of the central city because the lower cost housing was there, friends and relatives were likely to be there, and the older neighbourhoods then often had good public transport'.⁵⁸ But unlike other incoming groups a subsequent pattern of dispersal has not happened. Morrill⁵⁹ has suggested four reasons for this:

- 1 Prejudice and discrimination. These need no elaboration in this context.
- 2 Characteristics of the black. By this Morrill means to include all those difficulties faced by members of a minority group when they leave the shelter of the ghetto. This is especially acute when physical differences are evident.
- 3 Real estate and associated financial institutions.⁶⁰ Apart from any ideological commitment the interest of these people is to avoid any change in the character of an area that would result in prices falling. Once they do begin to fall the greatest profit is to be derived from encouraging rapid selling.
- 4 Legal and governmental barriers. These have been severely eroded over the last decade.

'In summary, the concentration of negroes in central cities results from a combination of forces. Some of these forces such as migration and initial settlement patterns in older neighbourhoods, are similar to those which affected previous ethnic minorities. Others—particularly discrimination in employment and segregation in housing and schools—are a result of white attitudes based on race and colour. These forces continue to shape the future of the central city'.⁶¹

Morrill, in the same paper quoted above, identified the expansion of the ghetto as a process of spatial diffusion. The mechanism is related to the gradual spread of black occupancy as marginal blocks are penetrated and then rapidly change in character (figure 11-8) so that any form of racial integration is most difficult to sustain. There can be identified for most blocks or streets what is called a 'tipping point',

⁵⁸ O. Kerner, chairman (1968) *Report of the National Advisory Commission on Civil Disorders*, 243-4 (New York).

⁵⁹ R. L. Morrill (1965) 'The Negro ghetto: problems and alternatives' *Geogr. Rev.* 55, 339-61.

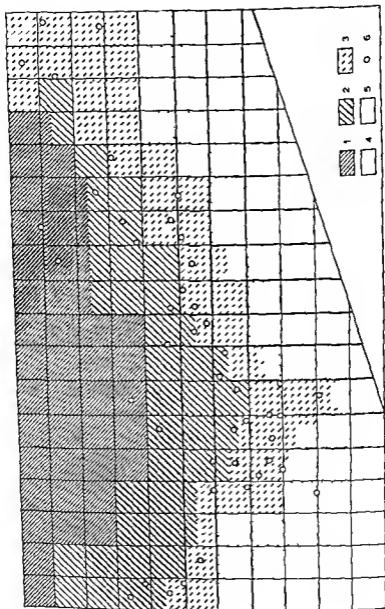
⁶⁰ For a valuable study see Joe T. Darden (1973) *Afro-Americans in Pittsburgh: the residential segregation of a people* (Lexington, Mass.).

⁶¹ O. Kerner, chairman (1968).

'once the proportion of non whites exceeds the limits of the neighbourhood's tolerance for inter-racial living (this is the tip point) the whites move out'⁶² A figure of 30 per cent black occupancy has been suggested as this figure, though it will vary in relation to a wide range of other factors⁶³

The effective result of these forces is the emergence in large cities of clearly marked ethnic areas representing this third component of social area make-up. The location of these areas is implicit in their history. As the exodus of white population from the centre of the city to the suburbs has proceeded, so the ghetto has been intensified as a portion of the inner city. If one accepts a spatial diffusion process for ghetto expansion then this will take place where white resistance is least effective. Since areas high in socio-economic status are sectoral, often retaining a link with the centre, the ghetto will tend to be squeezed into a sector like arrangement, made up of a series of blobs around the inner city. This is the situation which Murdie proposed for the ethnic areas of Toronto from his survey of that city.

A broad comparison can be made with the areas in British cities where immigrants have clustered. In a study of Birmingham P. N. Jones has argued that these are not to be called ghettos in the strict sense of the term since they are not exclusively dominated by one cultural group but are rather mixed areas.⁶⁴ In the clusters of immigrant areas he identified in Birmingham the coloured population only forms some 14.6 per cent of the population, with a maximum of 18.5 per cent. This compares with figures for example from Cleveland, Ohio, which show that 80 per cent of the black population lived in census tracts which were 75 per cent black in composition.⁶⁵ H. and T. Taeuber⁶⁶ employed the segregation index (see page 263) and found that for 207 of the largest US cities it was 86.2 in 1960. Jones is probably right, therefore, to argue that he is not dealing with ghettos in the proper sense. Nevertheless most studies of change between 1961 and 1966 showed that 'intensification has remained the dominant spatial process rather than a hoped for dispersal and suburbanization. Movement to areas of post 1920 housing, whether private or municipal, is clearly not enough to make any significant impact in comparison with the concen-



trations of the middle ring of the city⁸⁷ Figure 11.9 shows 11 clusters of immigrants Jones could identify in Birmingham in 1960. This suggests an arrangement both zonal and sectoral. There is a clear zone of occupation apparent which avoids the inner city and is closely linked to the high density middle-zone. This is a consequence partly of structural, partly of institutional factors. The inner zone is an area of late nineteenth-century slums, particularly of small houses or cottages built around courts. These are inherently ill suited to immigrant needs because of their very small size. Moreover large tracts are now municipally owned and scheduled as comprehensive redevelopment areas. The immigrant clusters have, therefore, been pushed out and have taken over the high density, later by law terraces and even larger but contemporary houses and villas. These have often leases with only a short time to run, which makes normal mortgages difficult to obtain so that they become available for a quick cash sale and are large enough to house immigrant families. This 'invasion' is made all the easier since the houses lack modern amenities, not only internally but externally as well, as for example in the absence of garages or garage space. The result is that 'the clusters are not typically sited in the slum ridden heart of the city, but in the tree lined, often attractive townscapes of the middle ring'⁸⁸

Two spatial influences have been at work to create this situation in Birmingham. The first is the physical and institutional restraints operating in the city centre which have prevented the take over of the oldest poorest properties. The second is the resistance from the suburbs together with the particular conditions required by the immigrants, the economic resources they have, and their need to

⁸⁷ P. N. Jones (1970) Some aspects of the changing distribution of coloured immigrants in Birmingham 1961-66 *Trans Inst Brit Geogr* 50, 217. See also S. W. C. Winchester (1973) Immigration and the immigrant in Coventry: a study in segregation *Inst. Brit. Geogr. Study Group in Urban Geog. Unpub. paper*

⁸⁸ P. N. Jones (1967) 22

Figure 11-8: Black purchases on the edge of a ghetto in one year. After R. L. Mornill (1965). The five shaded boxes refer to five identified areas within which the proportion of purchases in 1955 was as follows

Area	No. of white purchases	% total purchases	% area negro
1	8	3.9	32
2	26	4.3	16
3	67	40.6	5
4	72	98.7	1
5	112	100.0	<1

6 New street fronts with sales to negroes in 1955

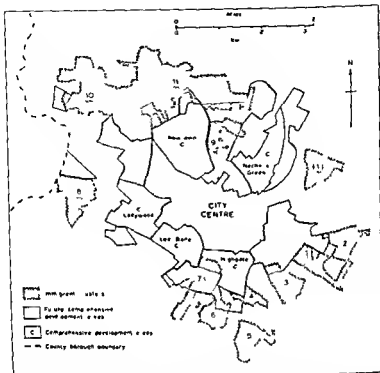


Figure 11-9. Immigrant clusters in Birmingham After P N Jones (1967) The immigrant clusters were identified by including all contiguous enumeration districts which belong to the upper quartile (10.1 per cent immigrant population). Completely surrounded districts which fell below the critical value were included. The colour definition is derived from foreign born residents from the West Indies, India and Pakistan. The clusters are: 1: Saltley, 2: Small Heath, 3: Sparkbrook, 4: Highgate, 5: Balsall Heath-North Moseley, 6: Cannon Hill, 7: Calthorpe Park, 8: Summerfield Park, 9: Newtown Aston, 10: Handsworth, 11: Aston.

For a recent summary using 1971 census data see Jones P N (1976) Colored minorities in Birmingham England *Ann Assoc. Amer. Geogr.* 66(1) 89-103

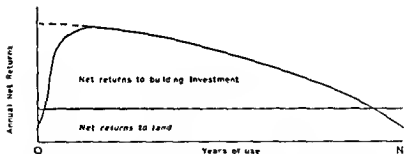
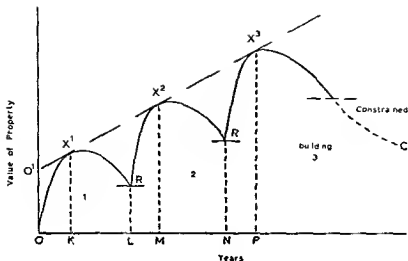


Figure 11-10: Lower diagram the expected net returns from investment in a new building Upper diagram idealized replacement cycle for individual buildings *After L S Bourne (1967)* The lower diagram is self explanatory In the upper diagram *O* represents the time of original construction while *K*, *M* and *P* indicate the time of the theoretical optimum net returns on the original investment *R* is the level at which replacement occurs and *L* and *N* redevelopment in the form of a new building The line $X^1-X^2-X^3$ represents the theoretical increase in total property value with replacement by more intensive uses

associate with people of a like cultural background. The result is a zone which is almost complete. Indeed if other immigrant groups, such as the Irish, are added the zonal picture becomes even clearer. This conforms to the generalized notion of a black collar around the CBD which is used in the Kerner report. In detail, however, this ring is rarely complete and often extends out as invasion and succession proceed. It is better to think of it as combining zonal and sectoral qualities.

Before concluding this section on the ethnic dimension it is necessary briefly to consider a characteristic part of most cities where economic and social forces react most clearly on the physical fabric—the slum. The slum has much in common with the ghetto and the classifications which have been proposed—slums of hope and slums of despair,⁶⁹ the 'urban village' and the 'urban jungle'⁷⁰—correspond with the 'tem

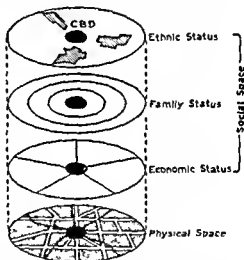


Figure 11-11. A model of the residential structure of the city. After R. A. Murdie (1969).

porary and the 'permanent' ghetto. The basic cause of central blight has already been examined: new building takes place progressively further away from the centre and slums occur where the reciprocal process of central redevelopment does not take place. There are several reasons for this imbalance. Buildings are long term investments and modification is costly. They are also not easily detachable from the

⁶⁹ C. Stokes (1967) *A theory of slums*. *Land Econ.* 48: 187-97.

⁷⁰ H. J. Gans (1967) *The urban villagers* 4 (New York).

area in which they are sited. The result is that with age and use the value of a building declines in terms of the net return on investment. A point can be reached when redevelopment would give a greater return—that is, it would compensate the cost of removing the building, the cost of a new one and the loss of returns during the process. Rising land values imply an increasingly intensive use⁷¹ (figure 11-10). This can be achieved by the subdivision of houses thus creating the situation where slum rents per unit area and return on capital are among the highest. If this does not happen a wide range of problems faces the potential developer, among them the difficulties of widespread ownership of small units and of acquisition. Moreover, any large area will include property in a variety of conditions—many planning authorities have been accused of the demolition of houses of good quality in a policy of comprehensive redevelopment. The result is that capital can be better devoted to the commercial property of the centre or the residential suburb. It is not economically viable for private capital to provide housing for low income groups, and thus the inner areas must either deteriorate into slums, be redeveloped by private capital as luxury apartment blocks or by public capital for housing. As they deteriorate they provide the milieu where the newcomer to the city can find refuge together with the dropout. In relation to the urban society at large those on their way to integration within it and those on their way to rejection of it, find common ground in an environment of decay and dilapidation.⁷²

Comments of this kind have been drawn together by J. A. Rex in a study of the 'sociology' of the zone in transition,⁷³ a characteristic area of the city already discussed in the context of the CBD. Rex presents a model based on three elements:

- 1 *A general theory of housing classes in the city.* This to a large extent accepts standard notions of the decay of central property and the flight to the suburbs. 'I suggest that the basic process underlying urban social interaction is competition for scarce and desired types of housing. In this process people are distinguished from one another by their strength in the housing market or, more generally,

- in the system of housing allocation.⁷⁴ Since Rex writes in a British context he has to pay more attention to the allocation of municipal housing than is found in work on the United States.
- 2 1 *theory of ethnic group relations and rural urban culture change*. This takes in the situations already discussed under the 'ethnicity component' and the role of the ghetto.
- 3 1 *theory of conflict and conflict resolution as between associations in the urban zone of transition*. This has not been discussed in this book since it is marginal to the primarily spatial concern of the geographer. But most certainly the way formal and informal associations mediate in the conflicts that arise out of ethnic and other group relations is of significance. Rex argues that such associations aim at overcoming social isolation, affirming meanings, values and beliefs, administering pastoral care and the attainment of group goals. The result is to modify conflict so that the tensions which must arise are offset, but the situation in the zone of transition is a highly unstable one and in any sudden crisis ethnic and class conflicts which are temporarily contained may crystallize and be pursued by more violent means.⁷⁵

Rex has effectively systematized the role of the slum and ghetto areas of the city or the zone of transition conceived as that area of the city where the least privileged housing classes live, especially the landlords and tenants of lodging houses. He is, however, concerned with a structural rather than a locational notion of the zone of transition which he conceives as only partly tied to the physical fabric of the city by the first of his three elements. At an earlier point in this volume (chapter 10, pp. 241-5) when the zone in transition was reviewed as part of the CBD margins, it was noted that in spite of the attempts to define it in terms of commercial and industrial uses, the second largest single use was residential. It has already been demonstrated that there is no zone as such in spatial terms but rather segments of land. The structural ideas put together by Rex illuminate the processes which are in operation. These must be integrated with the study of economic processes at work at the city centre before any meaningful study of spatial patterns can progress.

It is possible to combine the ethnic variable with socioeconomic status—including the lowest groups living in the so-called slum—and family status and to adopt Murdie's model as an indicator of the essential elements in the residential structure of the city (figure 11.11). This can be stated in terms of the hypotheses that Murdie proposed

⁷⁴ J. A. Rex (1968) 214.

⁷⁵ J. A. Rex (1968) 231.

- 1 Economic status tends to be associated with measures of income, occupation, and education and tends to be distributed sectorially
- 2 Family status tends to be associated with fertility, type of household, and labour force participation by women and tends to be distributed concentrically
- 3 Ethnic status tends to form 'groupings' which can be superimposed upon the cellular structure created by combinations of sectorial and concentric patterns⁷⁶

In spite of the brief inclusion of Birmingham, England, in the earlier discussion, the conclusions have been those derived from American literature and based on American experience. Certainly the 'family status' variable would not play anything like as important a role in Britain or western Europe as in the United States. In his study of Sunderland, Robson found that an analysis of thirty variables resulted in a first component which could be interpreted as associated with social class. The second component was a measure of housing conditions.⁷⁷ Neither family status nor ethnicity emerged. It is also worth of note that a study of Cardiff and Swansea produced a first component associated with housing conditions.⁷⁸

The view that British cities produce somewhat different dimensions in terms of factorial ecology as compared with North American examples has been challenged by Davies and Lewis in a study of Leicester.⁷⁹ From their analysis they state that 'it has proved possible to demonstrate that the basic urban dimensions of Leicester conform much more closely to the standard North American patterns than has hitherto been suggested'. Moreover it was also found appropriate to relate these dimensions in Leicester to concentric, sectoral and clustered spatial patterns as shown in figure 11-11.⁸⁰ Again R. J. Johnston⁸¹ in a study of four New Zealand cities (Auckland, Wellington, Christchurch and Dunedin) reaches a similar conclusion and proceeds to quote Timms's view that 'the demonstration that there are consistent

⁷⁶ R. A. Murdie (1969), 7.

⁷⁷ B. T. Robson (1969), 159-67.

⁷⁸ D. T. Herbert (1970), 82-88.

⁷⁹ W. K. D. Davies and G. J. Lewis (1973) 'The urban dimensions of Leicester, England', in B. D. Clark and M. B. Gleave, ed. (1973) *Social patterns in cities*. *Int. Brit. Geogr. Soc. Pub. 5* (London).

⁸⁰ G. J. Lewis (1972) 'Leicester—urban structure and regional relationships', in N. Pye, ed. (1972) *Leicester and its region* (Leicester). G. J. Lewis and W. K. D. Davies (1974) 'The social patterning of a British city: the case of Leicester 1964', *Tidskrift för geografi* 65 (3), 194-207.

⁸¹ R. J. Johnston (1973) 'Residential differentiation in major New Zealand urban areas: a comparative factorial ecology', in B. D. Clark and M. B. Gleave, ed. (1973).

patterns in the factorial invariance of cities in different parts of the world poses a major challenge to urban theory²² This is certainly true although three relevant areas of work need to be noted

- 1 Both Davies and Lewis and Johnson note that the standard dimensions can be considered as being made up of lower order components (See section 3 below)
- 2 Undoubtedly such theory will need to be related to ideas on the processes of modernization and the social changes which take place (See section 4)
- 3 Like studies of central place systems at an aggregate level, social area analysis leads to an impasse: it provides an effective description but explanation tends to move away from the aggregate to the individual level (See section 5)

3 SUBDIMENSIONS OF SOCIAL AREAS

Davies and Lewis in their Leicester study first establish an eight factor (first order) solution from the initial set of variables. The eight factors are identified as socioeconomic status, mobility, stage in life cycle, substandardness (of housing), mobile young adult, ethnicity, economic participation, urban fringe, females. They then proceed to factor analyse the matrix of correlations between the eight factors and to derive from the exercise three (second order) factors which they label social status, family status, ethnicity. The levels of generalization can be identified as follows

First order title	Loading	Second order title
Substandardness	-0.61	Social status
Urban fringe	+0.76	
Socio-economic status	+0.69	Family status
	+0.54	

——— First ranking correlations
 - - - Second ranking correlations

The social status dimension is made up of three subdimensions one of which refers to the quality of housing and another to characteristics of the rural urban fringe. The point of real interest however, is that in Britain socioeconomic status is not entirely separated from family status (see also p. 70) and this immediately indicates the need for some study to identify the form of any developmental sequence which may exist.

²² D. W. G. Timens (1971) *The urban mosaic: Towards a theory of residential segregation* (Cambridge). See also R. J. Johnston (1972) Towards a general model of intra-urban residential patterns. *Progress in Geography* 4, B2, 124.

4 A DEVELOPMENTAL MODEL OF SOCIAL AREAS

A starting point is the work of Abu Lughod on Cairo. Thirteen variables were employed in her analysis and the first factor abstracted was identified as representing style of life for the highly associated variables reflect economic aspects of a life style which in today's Cairo is increasingly finding expression in more modern family patterns of female education, delayed age of marriage and lower fertility. The second factor is interpreted as representing a male dominance and the third social dis-organization. But for present purposes the most significant finding is the close association between certain variables of family status and variables of social rank.⁸³ There are many possible explanations for such a situation which is at odds with that in American studies for example in Egypt the extended family is so pervasive an element of urban life that various stages of the family cycle are played out within the same households rather than isolated in sequential residential settings.⁸⁴ Even if such a relationship between social rank and family type is accepted it would still be possible to have a variable which could be called family status and disassociated from social rank providing two conditions were met—firstly that stages in the family cycle were clearly associated with changes in residence and secondly that a stock of sufficiently specialized housing existed to meet the changes in residence demanded at the different stages in the family cycle. These conditions do not obtain in most western countries indeed the Leicester evidence above indicates that they do not do so in Britain. It could be argued that the model presented by Murdie is particular to North America. Abu Lughod argues further that the conventional western variables are of little meaning in situations where contrasts derive from cultural variations between ethnic or tribal groups and where there is a low level of differentiation of housing type and a residual element of extended households. Immediately these points are made it becomes clear that an extended model is needed to take account of these variations in the scale of society and which will present a developmental continuum⁸⁵ that subsumes the contrasting locations of high quality residential areas in both pre industrial and industrial cities and the changes in development dealt with earlier (pp 177-9).

Such a developmental model is implicit in the polarized situations epitomized for the pre industrial city by Sjöberg and for modern

⁸³ J. L. Abu Lughod (1969) 207

⁸⁴ J. L. Abu Lughod (1969) 208

⁸⁵ B. J. L. Berry and P. H. Rees (1969) The factorial ecology of Calcutta *Am. J. Sociol.* 74: 442-91

industrial cities by contemporary factorial ecologies. We urgently need to establish the process of translation from one situation to the other. Indeed several studies explicitly portray this metamorphosis. In a study of four Latin American cities—Bogota, Quito, Lima and Santiago—Amato demonstrates the collapse of traditional patterns and the emergence of new spatial arrangements. 'With the advent of industrialization, the concomitant development of new transport facilities and the growth of commerce many cities moved away from (the) colonial model. The most dramatic occurrence, signalling the breakdown of traditional land use patterns, was the flight of the upper classes to suburban locations.'⁶⁶ Morris and Pyle write of Rio de Janeiro that though many would see it as an industrial city, in terms of its social organization it clearly 'maintains many of the features of the pre industrial city and of the transitional city'.⁶⁷ Here the explicit use of the word 'transitional' suggests a developmental model. Writing of Calcutta, Berry and Rees argue that 'there is increasing functional differentiation of land use, alongside regional occupational differentiation. And consistent with the notion of a city in transition, alongside these bases of differentiation are a strong land use and familism gradient, comparable in many ways to "modern" American formulations of urbanization'.⁶⁸ The bravest attempt to provide a synthetic framework for these changes has been made by Timms in *The urban mosaic*. Timms maintains that in society 'there is a high degree of pre modern coalescence between the criteria of social differentiation: an individual's status in one institutional realm is highly predictive of his standing in others. Status is ascribed and differences in prestige, way of life, ethnic identity and place of residence are intimately related. With modernization this coalescence breaks down. An individual's kinship connections no longer provide an almost perfect basis for predicting his social rank, his place of residence, or, even his ethnicity'.⁶⁹ Perhaps the most interesting feature of Timms's statement is its quite remarkable parallelism with the notions of Wirth: these were introduced in chapter 2 on the urbanization process and they were seen as the basis from which Sherry and Bell developed social area analysis. Timms implies that a change takes place from a single axis of differentiation in the pre industrial state to the more complex dimensions of the contemporary city. This is accompanied by spatial resorting of the type

⁶⁶ P. Amato (1970) *Elitism and settlement patterns in the Latin American city* *Jl Am Inst Town Plann* 36 (1), 96-105.

⁶⁷ F. B. Morris and G. F. Pyle (1971) *The social environment of Rio de Janeiro* *Econ Geogr* 47 (2 supplement) 286-99.

⁶⁸ B. J. L. Berry and P. H. Rees, (1969).

⁶⁹ D. W. G. Timms (1971), 138-149.

already noted in Latin American cities, but much more work is needed to identify this process of spatial change

It is not difficult to present a picture of past transformations in the cities of western Europe along similar lines. At times an easy parallelism has been maintained, but Warnes has questioned this on the basis that it was not changes in mobility that were crucial but adjacency to industrial installations. 'The evidence also makes it clear that the role of changing spatial mobility in transforming the residential structure of towns should not be overemphasized. At least as important was the changing organization and scale of employment. As the prevalence of domestic occupations ended and the size and range of other employing units increased, adjustments to the residential structure were taking place.'⁸⁰ Even so there is clear evidence that the owning classes were moving from centre to suburbs. And the need for on the spot control of early industry by entrepreneurs is not far removed from the notion of the immediate control of religious and political institutions in pre industrial societies. It is certainly possible to argue that the changing structure and modus operandi of industry are more significant than mobility as a factor on its own, but this certainly does not detract from the idea that changes in nineteenth century Europe parallel those taking place in the less developed world.

5 RESIDENTIAL LOCATION THE PROBLEM OF DISAGGREGATION AND RESIDENTIAL CHOICE

It is possible to introduce this problem by the examination of household activity systems, in much the same way as the activities of firms were suggested as providing a profitable approach to the CBD. Household activities include a vast range extending from work to social and recreational activities and to shopping.⁸¹ There are few studies of this sort and results from investigations are not very fruitful,⁸² but one study from Detroit⁸³ illustrates the principle and relates back to the previous discussion in this chapter. For each of five major sectors of metropolitan Detroit, the centres of white and black populations had been calculated in a previous study⁸⁴ and joined to form a 'centre line'

⁸⁰ A. M. Warnes (1973) *Residential patterns in an emerging industrial town*, in B. D. Clark and M. B. Gleave, editors (1973), 169-189.

⁸¹ For a list see F. S. Chapin (1965) *Urban land use planning* p. 243 (Urbana Ill.).

⁸² G. C. Hemmens (1968) 'The structure of urban activity linkages. *Univ. of N. Carolina at Chapel Hill Centre for Urban and Regional Studies Urb. Stud. Res. Monog.*

⁸³ R. V. Smith, S. F. Flory, R. L. Bashaw and G. W. Shannon (1967) *Community interaction and racial integration in the Detroit area, an ecological analysis*. Report derived from project 2557, US Office of Education (Eastern Michigan University).

⁸⁴ A. J. Mayer and T. F. Hoult (1962) *Race and residence in Detroit*. Wayne State University, Institute for Regional and Urban Studies.

of white and negro population (figure 11-12) A similar technique was now used to define a centre line based on a stratified sample of population questioned as to 'the location of meeting places of all formal associations they belonged to, as well as the residence location of all friends, neighbours, relatives and co workers with whom they interacted In this manner point locations were derived for all formal and informal associational activities of each respondent'⁹⁵ From these points a mean centre of gravity was computed for each sector and joined to form an interaction line (figure 11-12) From this it is clear that residential segregation is associated with segregated interaction The activity systems of these two populations, in the study context, are related to different areas

To some extent it can be suggested that residential choice—particularly in intra-urban relocation which plays a large part in determining the total pattern—is the function of the total of these activity systems But there are two sorts of activity which could control residential choice The one is directed towards employment and place of work and the other to social and leisure activities Moriarty has examined the relative stress to be put on these two controls considering them as competing hypotheses⁹⁶ The first he calls the 'economic competition' hypothesis in which the ability to pay is the basic factor and in consequence journey-to work and site costs are the major influences in the residential decision Differences in the locational behaviour of residential decision makers are due to differences in their budget costs and income resources, and it is this difference that determines the spatial distribution of socio-economic groups in urban space⁹⁷ Moriarty maintains that such a proposition is nowhere supported by empirical evidence and sets out in contrast the second 'social choice' hypothesis which argues that residential decisions stem from conscious, or indeed subconscious social choice related to the differing values, needs and desires of people Most empirical studies reject the 'economic competition' interpretation and find no relation between social class and distance to work For example, Halvorson reports, 'the major conclusion to be drawn from the data summarized is a negative one—the journey to work or work access constitutes a rather minor factor in the residential location decision'⁹⁸ Halvorson goes on to positive conclusions which relate residential location decision to the quality of

⁹⁵ R. V. Smith *et alia* (1967), 13

⁹⁶ B. M. Moriarty (1970) A test of alternative hypotheses of urban residential growth *Proc Assoc of Am Geog* 2, 97-101

⁹⁷ B. M. Moriarty (1970), 98

⁹⁸ P. Halvorson (1970) *Residential location and the journey-to work in Charleston West Virginia* 178 Univ of Cincinnati unpubl. Ph.D. thesis

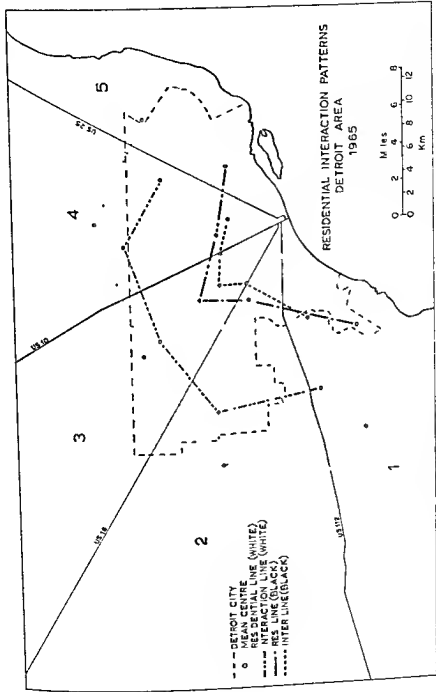


Figure 11-12: Residential interaction patterns in the Detroit Area 1965 The method of construction of the residential and interaction lines is indicated in the text *After R V Smith et alia (1967)*

housing and the quality of the housing environment. Similar results have been widely reported and have led to an emphasis on decision making and environmental perception as main areas of current investigation.

These areas of present investigation are best presented in a residential location decision model which sets out the reasons operative in the selection of a particular location. This has been done in diagrammatic form by Herbert and fig 11-13 is derived from his model.⁹⁹ The key concepts are to be found in the work of Wolpert¹⁰⁰ and of Brown and Moore.¹⁰¹ The individual household can be considered to be under the influence of two sets of forces. One is internal, in that it is generated by the household itself and defined in terms of its own needs and expectations, the other is external and defined by the characteristics of the locale. These two sets interact in creating 'place utility', which essentially measures an individual's level of satisfaction or dissatisfaction with a given location. 'If the place utility of the present residential site diverges sufficiently from his immediate needs, the individual will consider a new location'.¹⁰² The divergence between present site and possible new locations is set up by the operation of 'stressors', or by any change which alters, or threatens to alter, the status quo. These could be related either to internal factors—for example, an increase in family size by the birth of children or the coming of in laws to live with the nuclear family—or to external forces such as the building of a nearby motorway or the buying up of proximate houses by people of different ethnic origin. They need not be as tangible as these examples. For instance, a change in the way the household regards its social status could give rise to stresses. From the impact of such stresses comes the decision to consider the possibility of an alternative location. Two related problems face the household in their consideration. The first is to define the qualities to be expected at a new location and the second to carry out a search in order to find such a location.

A number of studies have attempted to list and compare desirable qualities. Perhaps the most useful is that by Butler, Chapin *et alia*.¹⁰³

⁹⁹ D. T. Herbert (1972) *Urban Geography: A social perspective*, 246-256 (Newton Abbot).

¹⁰⁰ J. Wolpert (1965) Behavioural Aspects of the decision to migrate *Papers Reg. Sci. Assoc.* 15, 159-169.

¹⁰¹ L. A. Brown and E. G. Moore (1970) The intra urban migration process: a perspective *Geogr. Annaler (Series B)* 52, 1-13.

¹⁰² L. A. Brown and E. G. Moore (1970, 1).

¹⁰³ E. W. Butler, F. S. Chapin *et alia* (1969) Moving behavior: a residential choice. A national survey. *US Highway Research Board, National cooperative highway research report* 81 (Washington DC).

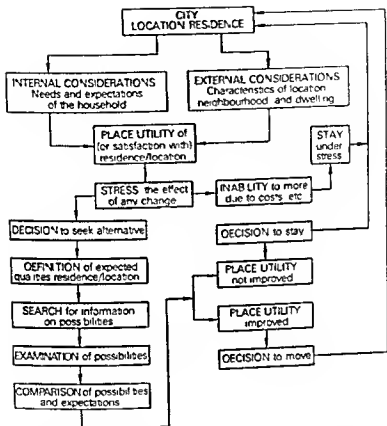


Figure 11-13: A residential location decision model
 Modified from D. T. Herbert (1972). Note that place utility is a complex notion and will be determined by a complex series of trade offs, of which the most obvious is a desired house in an undesirable location against an inadequate house in a desired area.

who from a nationwide survey in the United States report that metropolitan households prefer

- 1 Better neighbourhood quality with either a less desirable housing unit or less accessible location over a less desirable neighbourhood with either a better housing unit or better accessibility (Overwhelmingly—approximately 70 per cent to 27 per cent)
- 2 A house that is desirable inside but appears less so outside to one where an attractive exterior belies the interior (Overwhelmingly—80.4 per cent to 14.2 per cent)
- 3 Access to better than average schools in an area with higher taxes to lower taxes and less desirable schools (Overwhelmingly—78.3 per cent to 15.2 per cent)
- 4 A conflicting combination of a new or fairly new house together with a well established neighbourhood
- 5 Modern architectural style to traditional (But barely—43.3 per cent to 37.6 per cent)
- 6 A housing unit all on one floor
- 7 Few children in the neighbourhood
- 8 Large lots to small lots

A listing of possible qualities is also presented by Brown and Moore.¹⁰⁴ Attempts to identify the most consistently emphasized features have isolated two—the house itself that is the various physical features of the dwelling especially the space available and its social and physical environment.

Perhaps the most interesting attempt to approach this problem has been G. L. Petersen's.¹⁰⁵ Respondents were asked to detail their judgements on photographs of residential areas rated in relation to ten selected variables. The replies were factor analysed to produce a first factor which was essentially physical quality closely associated with age of the structures and the second an environmental quality named harmony with nature as reflected in such things as amount of greenery, privacy and open space.

After the definition of expected qualities, the household is then faced with the problem of searching for information on the possibilities available. A diagram constructed by Silk is reproduced (figure 11.14).

¹⁰⁴ L. A. Brown and E. G. Moore (1970) 5

¹⁰⁵ G. L. Petersen (1967) A model of preference: quantitative analysis of the perception of the visual appearance of residential neighbourhoods *J. Reg. Sci. Assoc.* 7: 19-31

Webber's non place urban realms all the more significant ¹⁰⁷ If people structure their lives within these realms then the problem arises of identifying this structuring and assessing its impact on spatial behaviour, and so one enters the field of 'social networks in urban situations' The book edited by J. C. Mitchell with that title ¹⁰⁸ is concerned with central African towns, but the basic notions set out there can be generally applied to the various realms in which the individual operates In order to give some indication of the flavour of Mitchell's work it is worthwhile outlining very briefly his identification of the morphological and interactional characteristics of social networks ¹⁰⁹ The morphological characteristics are

- 1 *Anchorage* This defines the point of origin of the network but this can have no absolute meaning, it must be defined in the context of an investigation as the individual on whom the network is fixed or anchored
- 2 *Reachability* This defines the degree to which an individual can be contacted via the network or the extent to which he can contact others The ease with which others can be reached is of obvious importance to any network
- 3 *Density* This is a different concept to reachability for it measures the interaction between all members of the network
- 4 *Range* This assesses the number of people in regular and direct contact with an individual

The interactional criteria are

- 5 *Content* This defines the basis on which contacts within the networks are made It could, for example, be kinship, religion, work or friendship
- 6 *Directedness* This is a measure of reciprocity, of the extent to which contacts are one way or not
- 7 *Durability* Some networks come into being for a very specific purpose, perhaps to advocate a public policy of some sort, and then disappear Not all networks are permanent
- 8 *Intensity* Individuals will vary in the degree to which they feel themselves committed to the network, ranging from the complete commitment that its members may feel to an organization like the Mafia to a much more casual involvement in minor causes It is

¹⁰⁷ M. M. Webber (1964) The urban place and the nonplace urban realm, in M. M. Webber *et alia* editors (1964) *Explorations into urban structure* (Philadelphia) See p. 310

¹⁰⁸ J. C. Mitchell (1969) *Social networks in urban situations* (Manchester)

¹⁰⁹ This outline is from J. C. Mitchell (1969) The concept and use of social networks in J. C. Mitchell, ed. (1969) 1-50

worth observing that in common everyday terms the word 'Mafia' is used to denote a network.

- 9 *Frequency* The frequency of contact between the members will vary and this becomes a measurable feature of interaction

These nine measures can be applied to any interactive situation whether it be a complex of business links or a pattern of golf club membership. It is implicit in the ideas of Wirth and the reasons of Webber, that in an urban context these various reticules become discrete as the urbanite segregates the roles played. In all this the geographer has a tenuous interest but, although the networks display aspatial interactions between populations, implicit within them are relative locations and hence spatial manifestations. As Connell writes 'the content of these spatial links remains critical and morphological networks alone are inadequate, social networks, by definition, are only marginally spatial'.¹¹⁰ The investigation of the spatial articulation of urban social networks presents a research problem for the geographer. It might well reveal the extent to which new small scale 'communities' are emerging within the larger urban region and the relevance these have in the residential location decision.

The end result of these studies of the individual or household's residential location decision should be to build up from this microscopic level to the explanation of the location and characteristics of residential areas. This supposedly avoids the impasse of inadequate explanation to which macro-scaled studies are tied, just as consumer behaviour studies supposedly provide new directions from the unsatisfactory aggregate model of central place theory. But reference to central place will reveal that here again the problem of scale is fundamental (see above, pp. 379-81) and that the dilemma presented earlier in this chapter in the paper by Moriarty is not properly posed or resolved.¹¹¹ The priority of influences in residential decision making will be related to the scale at which the decision is being made. Unless that scale is very carefully specified then confusion will arise. At the crudest aggregate scale of the whole city, decisions will relate to the ease of journey to work and cost, for to suggest that price is not a highly pertinent factor is to fly in the face of reason. At this level, and appropriately, the various aggregate models are pitched, such as those derived by Wilson¹¹² from the Lowry formulation. At a somewhat larger scale the constraints of workplace and of crude cost will be set aside and general neighbourhood characteristics might well become

¹¹⁰ J. Connell (1973) *Social networks in urban society*, in B. D. Clark and M. B. Gleave, editor (1973)

¹¹¹ See page 292

¹¹² A. G. Wilson (1973) *Urban and regional models in geography and planning* (London)

pertinent as 'residential neighbourhoods', sieved out at the first scale of the search, are compared. Finally, at the largest scale the qualities of the house itself become paramount. It is certainly not easy to disaggregate into a logical system the various scales of decision for this presupposes that individuals structure complex decisions rather than act on impulse or without logic. The argument here presented assumes an unreal hierarchical ordering in decision.

Perhaps the most interesting point is to relate the standard dimensions of factorial ecologies to the stressors in the location decision model. The family cycle is certainly one of the major precipitators of household moves: marriage, the production of children and the schooling of children are obvious stressors. Socio-economic status is a complex notion but it certainly subsumes the household's own view of its social standing, which it might wish its house to display, and also the money it can deploy to externalize that view in bricks and mortar or stone. Finally ethnicity can be related broadly to the notion of territoriality which might define those parts of the city acceptable to the household. To equate territoriality with action space is perhaps open to criticism but the basic notions are not far apart. Thus the interaction study of Detroit presented earlier (page 291) as one of an aggregated scale of study is not as far apart as is sometimes suggested from behavioural studies at the micro scale. Future progress seems to lie in the attempts to specify scale in order to analyse the way in which the pay offs between scales are operated. But like studies in consumer behaviour the ultimate reduction of this approach is to the individual level where the psychologist should be most competent. Even the individual has to be specified, for many studies refer to 'his' decision, but it is the household which moves and which married partner predominates in the process is relevant. This creates a field of study a good deal removed from the conventional geographic basis of pattern analysis.¹¹³

6 SOCIAL AREAS AND SOCIAL RELEVANCE

There is a danger that academic discussion of statistical niceties, or an increasingly complex review of the locational selection processes of

¹¹³ This chapter has made no attempt to review those studies which have attempted to simulate residential growth of cities. The more important are R. Main, Gunnar Olsson and O. Warneryd (1966) *Approaches to simulations of urban growth* *Geogr. Annls.* 48B, 9-22. E. J. Koser and S. F. Weiss (1968) Some components of a linked model for the residential development decision process *Proc. Assoc. Am. Geogr.* 1, 75-9. This is a convenient source which includes reference to work on a similar theme published elsewhere by the two authors. B. Malisz (1969) Implications for threshold theory for urban and regional planning *J. Th. Plans. Inst.* 55, 108-10. Threshold theory is somewhat different in approach but has the same end in view.

those who can afford to choose, can become somewhat remote from the city in reality. The direct relevance of these ecological studies, however, can be found in the growing field of the study of the indicators of deprivation. There is the initial problem of the extent to which deprivation can be considered in areal and ecological terms and as a problem in a complex or multiple situation rather than as a series of discrete situations. If this is set aside it can be argued that if parts of or areas within the city are underprivileged or relatively deprived then identification can be derived from the social area studies which this chapter has reviewed. At the same time the dimensions of social malaise will be revealed, whether these are related to physical housing conditions and the incidence of disease, economic disadvantage through employment situations, or to delinquency, crime and the problems of deviant behaviour. This short section cannot hope to consider the growing range of literature in relation to delinquency or criminal areas¹¹⁴ and the social indicators of deprivation.¹¹⁵ Nevertheless the identification and characterization of areas is a basic geographical concern and the techniques have been developed through work in social area analysis and factorial ecology. A good example of this is the work of Giggs who has attempted to identify socially disorganized areas in Barry,¹¹⁶ and to analyse the spatial patterning of schizophrenics in Nottingham.¹¹⁷

If such spatial analyses are looked upon as descriptive it can be argued that a dynamic theory of deprived areas in urban situations will only emerge from such studies and is essential to the understanding needed for immediate remedial action. The more esoteric search for the deeper causes in fundamental social and economic processes is more related to political philosophy than urban geography and the reductionist problem appears as in all such contexts. Nevertheless some consideration of work by geographers on the relationships between social and economic processes and the geography of the city is given in the concluding chapter (see pp. 368-85).

¹¹⁴ For one of the earliest British works see T. Morris (1957) *The criminal area: a study in social ecology* (London), but the use of the term 'delinquency area' is much earlier and derives from the work of the Chicago ecologists: see C. R. Shaw (1929) *Delinquency areas: a study of the geographic distribution of school truants, juvenile delinquents and adult offenders in Chicago* (Chicago).

¹¹⁵ D. Donnison (1974) *Policies for priority areas* *Journal of Social Policy* 3, 127-35. A general volume is R. E. Pahl (1970) *Which city?* (London).

¹¹⁶ J. A. Giggs (1970) *Socially disorganized areas in Barry: a multivariate analysis* chapter 6 in H. Carter and W. K. D. Davies (eds) (1970) *Urban essays: studies in the geography of Wales* (London).

¹¹⁷ J. A. Giggs (1973) *The distribution of schizophrenics in Nottingham* *Transactions of the British Geographical Society* 59, 55-76.

Notes on further reading

There is not a great deal of material which deals in a geographical context with the physical character of residential areas. A general volume of use is

GIEDION E (1959) *Space, time and architecture*, third edition (Cambridge, Mass.)

Smailes's early contribution is still of value.

SMILES A E (1955) Some reflections on the geographical description and analysis of townscapes *Trans Inst Brit Geogr*, 21, 101

while the volume by Johns also noted in chapter 8 is relevant

JOHNS, E (1965) *British townscapes* (see footnote 9)

The main references to residential patterns are included in the footnotes but the following recent works should be consulted (they all contain bibliographies)

EVANS, A W (1973) *The economics of residential location* (London)

JOHNSTON R J (1971) *Urban residential patterns* (London)

HERBERT, D (1972) *Urban geography: a social perspective* (see footnote 99)

MUTH R F (1969) *Cities and housing: The spatial pattern of urban residential land use* (Chicago)

ROBSON B T (1969) *Urban analysis: a study of city structure with special reference to Sunderland* (see footnote 31)

TUMS D W G (1971) *The urban mosaic: Towards a theory of residential segregation* (see footnote 82)

Two resource papers of the Association of American Geographers provide useful summary references

MAYER H M (1969) The spatial expression of urban growth *Resource Paper 7*

ROSE H M (1969) Social processes in the city: race and urban residential choice *Resource Paper 6*

The working papers of the Centre for Environmental Studies, London, are also useful reading including

MARTIN, D R (1969) The housing market CES-11 P 28

WILSON, A G (1968) Development of some elementary residential location models CES-11 P 22

In relation to residential choice R work frequently quoted is

ROSSI P H (1955) *Why families move* (see footnote 54)

Also worthy of consultation are

BUTLER, E W, *et alia* (1969) Moving behavior and residential choice: a national survey *Nat Co-op Highway Res Progr Report*, 81 (Washington D C)

LANSING, J B and BATH, N (1964) *Residential location and urban mobility: a multivariate analysis* (Ann Arbor, Mich.)

TAAPE, E J, GARNER, B J and YEATES, M H (1963) *The peripheral journey to work: a geographic consideration* (Evanston, Illinois)

VANCE, J E, JR (1966) Housing the worker: the employment linkage as a force in urban structure *Econ Geog* 42, 294-325

- VANCE, J E JR (1967) Housing the worker determinative and contingent ties in nineteenth century Birmingham *Econ Geog* 43, 95-127
- WOLFERT J (1965) Behavioural aspects of the decision to migrate *Papers Reg Sci Assoc* 15, 159-69
- WOLFERT, J (1966) Migration as an adjustment to environmental stress *J Soc Issues* 22, 92-102

Social area analysis has now built up an extensive literature. The most useful introductions are in the books by Robson and Timms cited above and also

- JONES F LANCASTER (1969) *Dimensions of urban social structure the social areas of Melbourne, Australia* (Canberra)
- MURDIE R A (1969) Factorial ecology of metropolitan Toronto 1951-1961 (see footnote 37)

A complete issue of *Economic Geography* was devoted to urban ecology and this is an essential element in the literature

- BERRY, B J L, editor (1971) Comparative factorial ecology *Econ Geog* 47 (2 Supplement), 209-367

See also for higher order factors

- GIGGS J A and MATHER P M (1975) Factorial ecology and factor invariance an investigation *Econ Geog* 51, 366-82

An introduction to the study in the context of human ecology appears in

- THEODORSON, C A (1961) *Studies in human ecology* 226-53 (New York)

In relation to the social indicators and the relevance issue three good introductory items, each with bibliographies are

- KNOX P L (1975) *Social well being a spatial perspective* (Oxford)
- SMITH D M (1973) *The geography of social well being in the United States* (New York)
- SMITH D M (1974) Crime rates as territorial social indicators the case of the United States *Dept of Geog Queen Mary College Univ of London Occasional Papers* 1

An excellent summary of social area analysis appeared as this chapter was in proof. This is

- Robson, B T (1975) *Urban Social Areas* (Oxford)

The space into which the town extends as the process of dispersion operates has created the concept of a rural-urban fringe, an area with distinctive characteristics which is only partly assimilated into the growing urban complex, which is still partly rural and where many of the residents live in the country but are not socially and economically of it. The foregoing introductory sentence reveals two somewhat different terms of reference. The first refers directly to the physical characteristics of area, the second to the social characteristics of the occupants and it is as well that these are kept carefully apart. Two aspects can therefore be considered:

- 1 The notion of the fringe as a distinctive physical area or region of the city, primarily designated by characteristic land use associations
- 2 The notion of the fringe as that area where urbanization impinges on rurality and therefore, where the processes envisaged by Wirth¹ can best be observed and, indeed, should be in operation. The rural-urban continuum should most effectively be studied within the confines of this geographical area.

1 THE RURAL-URBAN FRINGE AS A REGION OF THE CITY

A large amount of literature appeared roughly during the period from the mid-1940s to the beginning of the 1960s, which was concerned with the physical delimitation and the defining features of the rural-urban fringe.² In land use terms Wissink³ has called it an area of 'great differentiation', while Colledge⁴ used the term, 'a geographical no-man's land'. Both these expressions are derived from the wide variety of uses found in an area which has been only partly brought into the urban complex. The city does not grow outwards in well

¹ See chapter 2.

² For a consideration of definitions see R. A. Kurtz and J. B. Eicher (1958) *Fringe and suburb: a confusion of concepts* *Soc Forces* 37, 32-7.

³ G. A. Wissink (1962) *American cities in perspective, with special reference to the development of their fringe areas* 201 (Aven).

⁴ R. G. Colledge (1960) *Sydney's metropolitan fringes: a study in urban rural relations* *Aust Geogr* 7, 243-55.

defined, advancing rings of rapidly completed development. It extends haphazardly, making rapid advances at one point and hardly moving at all at another. It is this process which occasions the incoherent land-use pattern which is taken as representative of the fringe. This is not something associated particularly and uniquely with present metropolitan growth. The fringe belts which Conzen and Whitehead have recognized as significant determinants of the morphology of urban settlements⁵ represent the continuing influence of former fringes long after they have been encompassed by the advancing urban front. Schnore and Knights⁶ have demonstrated how early a feature metropolitan expansion was in the United States.

At the city margins, therefore, in the context of the fringe, a wide mix of land-uses is characteristic ranging from the old, untouched rural villages to modern residential estates, from a variety of commercial developments, including out-of-town shopping centres to the city services and industries which are conveniently located at the margins. Wehrwein⁷ described the fringe in the USA as an 'institutional desert' because of the uncontrolled location there of unpleasant and noxious establishments such as slaughter-houses, junkyards and wholesale oil storage, and of utilities such as sewage plants and cemeteries. Once again it is worth emphasizing that the latter, too, are not a feature of the twentieth century. Figure 12-1 presents a good example of the way in which public services had grown outside the intensely built up area of Paris by the end of the nineteenth century.⁸ The range of defensive works, mental hospitals, cemeteries and waterworks, while characteristic of the period, illustrates the process convincingly. In a contemporary context the various land users, older villages, newer residential extensions, commerce, industry, city services and the underlying farming, are not neatly sorted out into homogeneous areas but are intermingled in random fashion and it is this which gives its distinctive quality to the land use pattern of the rural-urban fringe.⁹ It is also possible to translate this somewhat static narrative of land uses into a more dynamic statement of process. Colledge in a study of Sydney presented seven propositions:¹⁰

1. There is a constantly changing pattern of land occupation
2. Farms are small

⁵ See chapter 8.

⁶ L. S. Schnore and P. R. Knights (1969) *Residence and social structure* (Boston) in the ante-bellum period. in S. Thernstrom and R. Sennett, editors (1969) *Neighborhoods* (New Haven and London) 247-57.

⁷ G. S. Wehrwein (1942) *The rural-urban fringe*. *Econ. Geogr.* 18, 21-28.

⁸ J. Bastié (1964) *La croissance de la banlieue parisienne* 186 (Paris).

⁹ G. A. Wainwright (1962)

¹⁰ R. G. Colledge (1961)

- 3 Crop production is intensive
- 4 The population is mobile and of low or moderate density
- 5 Residential expansion is rapid
- 6 The provision of services and public utilities is incomplete
- 7 Speculative building is common

These conditions reflect the nature of the fringe as already outlined and represent the push into rural surrounds of young, mobile middle class populations and the attempts by speculative builders to provide for them at a rate which, in some cases, outreaches the input of services and utilities. The only additional features Golledge includes are farm size and crop production, presumably related to urban demand.

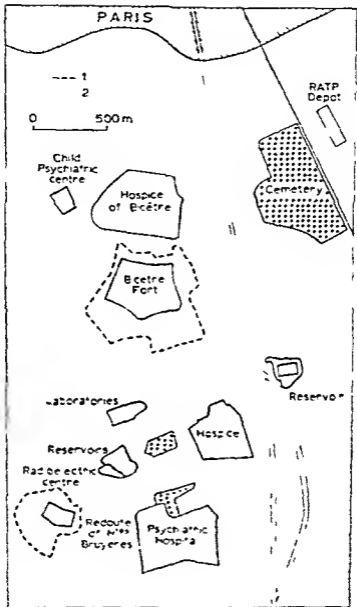
R. E. Pahl¹¹ has also attempted to summarize the characteristics of the fringe and his four main headings take in many of the characteristics proposed by Golledge.

(1) *Segregation* The ability to pay for the new housing of the fringe results in a pattern of segregation appearing. Giggs in a study of Nottingham¹² showed that not only are there basic differences between the north and west which was built up and industrialized in the nineteenth century and is suburb rather than fringe, and the south and east, which is still underdeveloped and can be considered part of the fringe, but that within the south and east clear differences can be identified. A cluster analysis of 78 parishes using 15 variables was carried out, the variables representing population growth, age structure, housing characteristics, socio-economic status, employment, work place and mode of travel, mobility and dependency. Significant differences between the parishes were revealed and four sets were identified. Giggs recognizes these as Set 1, modern mining settlements, Set 2, large residential suburbs, Set 3, small residential suburbs, Set 4, small villages, i.e. unmodified villages. He concludes, 'the major residential tracts of the suburbs—old villages, private housing, council estates and miners' estates—are all clearly segregated, with the private estates generally located closest to the old village cores. Large planned tracts are given to commercial, educational and institutional uses'.¹³ A characteristic variety of settlement form is accompanied by segregation of population by 'class'. To such an extent is this developed that many parts of the fringe become status symbols in a residential context, they are *the* places in which to live.

¹¹ R. E. Pahl (1965) *Urbs in rure. The metropolitan fringe in Hertfordshire* London School of Economics and Political Science, Geogr. Pap. 2.

¹² J. Giggs (1970) *Fringe expansion and suburbanization around Nottingham, a metropolitan area approach* *E. Midland Geogr.* 5, 9.

¹³ J. Giggs (1970) 17.



(ii) *Selective immigration* The rural-urban fringe will attract in particular 'mobile, middle class commuters who tend to live and work in distinct and separate social and economic worlds from the established populations'¹⁴ Those who come to live in the fringe constitute a small section of the whole urban community and they tend to retain their orientation towards the city. Many studies have demonstrated a pattern of linkages that is unrelated to the fringe itself. Rodehaver¹⁵ in 1946 in a study of Madison, Wisconsin, identified the strong pull on the urban migrants to the central city for work, shopping, church-going and social activities. Martin¹⁶ in Eugene, Oregon, found similarly that people of the fringe considered themselves urbanites, while Kurtz and Smith¹⁷ in a study of Lansing, Michigan, concluded that the urban migrants to the fringe returned to the city, even to the areas of previous residence for social activities.

(iii) *Commuting* This follows from the previous point and needs little comment except to note that it is not confined to the more wealthy but the availability and cost of transport necessarily confine the less well-off.

(iv) *The collapse of geographical and social hierarchies* This is one of the most interesting of Pahl's conclusions and advances the concept of a distinctive fringe. With the populations partly directed towards other parts of the city for certain services, then the service content of fringe settlements becomes modified. They do not need to carry an array of goods and services commensurate with the population they serve, but can become specialized in particular directions. It is possible that conventional central place ideas would not apply in direct fashion and that something akin to the dispersed city¹⁸ is appearing in the fringe. Instead of rounded bundles of functions at particular hierarchical levels collected at appropriate nodes, the various functions are being dispersed in several nodes in specialized or segregated bundles, the whole process being precipitated by the mobility of the population.

¹⁴ R. E. Pahl (1965) 72

¹⁵ M. Rodehaver (N.D.) *The rural-urban fringe: an interstitial area* 66-9 (Univ. Wisconsin Unpublished Ph.D. thesis)

¹⁶ W. T. Martin (1952) A consideration of differences in the extent and location of the formal associational activities of rural-urban fringe residents *Am. Sociol. Rev.* 17, 687-94

¹⁷ R. A. Kurtz and J. Smith (1961) Social life in the rural-urban fringe *Rur. Sociol.* 26, 24-38

¹⁸ I. Burton (1963) A restatement of the dispersed city hypothesis *Ann. Assoc. Am. Geogr.* 53,

Likewise the segregation of incoming groups, with their links back to the city, reflects on the traditional social hierarchies of the rural areas

Pahl summarizes the above points by maintaining that 'a new population is invading local communities, bringing in national values and class consciousness at the same time that a new type of community, associated with dispersed living is emerging'¹⁹ Here, however, the argument has moved far away from the concept of a fringe as a physical area to one associated with particular social processes. One view considers the rural urban fringe as identified by static features: a mix of land uses brought about by the incomplete extension of the city as well as the demands which it makes on its marginal areas. The other view sees the fringe as showing distinction in the nature of the communities which occupy it, brought about by the migration of mobile middle class families orientated to the city and dominated by urban life styles.

2 THE RURAL-URBAN FRINGE AND THE RURAL-URBAN CONTINUUM

In the context of the geographical study of city structure and the fringe as part of it, this aspect is not as immediately relevant. But it reflects both on the conclusion in the last paragraph and on the earlier discussion in chapter 2 of the urbanization process. If a transformation takes place on a rural-urban continuum as proposed by the followers of Wirth then internationally it can be demonstrated by national comparisons, if that scale is meaningful, but intra-nationally the changes should be most apparent where the urban frontier extends into rural areas. But the simple urban rural dichotomy cannot be maintained against the existence of the 'urban village' and the 'metropolitan village'. The concept of the 'urban village' has already been introduced and many studies have shown the existence in city centres of distinct enclaves where the kinship linkages are intense and where there is a high density of social contact giving a cohesiveness conventionally ascribed to rural settlements.²⁰ The notion of 'anomie' does not easily fit into relationships in older working class areas. Not only does London's East End provide examples of this but also the mining settlements of South Wales where the intense nexus of family and social relationships, based on face to face contacts provided a social context anything but 'anomic'. Indeed the preservation of the Welsh language in this urban situation contradicts ideas of its solely rural survival. As a complete opposite Pahl argues the case for the 'metropolitan village'²¹ where the characteristics are largely derived

¹⁹ R. E. Pahl (1965) 79. ²⁰ H. J. Gans (1962) *The urban villagers* (New York)

²¹ R. E. Pahl (1968) *The rural urban continuum*, in R. E. Pahl, editor (1968) *Readings in urban sociology*, 268 (London)

from the four features of fringe populations examined earlier. This is, in other words, the commuter village, where the mobile middle class builds a highly dispersed pattern of activities based not on a place, but on the region. To a large extent their choice of residence is associated with class and life cycle stage, but Pahl adds two other features which influence the way of life. These are the necessary associations with other life styles in small and heterogeneous settlements and the relationships developed in the general social organization of the village, an involvement and an interaction. 'The sociologically most significant feature of this settlement type is the interaction of status groups which have been determined nationally—by the educational system, the industrial system and so on—in a small scale situation.'²² If this line of thought is carried on it has a marked reflection on the idea of a rural urban continuum or the process of urbanization. 'Whether we call the processes acting on the local community "urbanization", "differentiation", "modernization", "mass society", or whatever, it is clear that it is not so much communities that are acted upon as groups and individuals at particular places in the social structure. Any attempt to tie particular patterns of social relationships to specific geographical milieux is a singularly fruitless exercise.'²³ This last view is especially worthy of discussion for not only does it reject the notion of 'rural' and 'urban' contexts for categorizing behaviour but thereby reflects on any idea that the fringe is characterized by the sorts of transformation that are associated with the rural urban continuum. But to some extent the argument is illusory. It must be accepted that the sociologist is concerned primarily with aspatial structural processes that differentiate society, and one can accept Pahl's view that the relationships that are derived cannot simply be assigned a spatial context. The contrast between what is 'local' and what is 'national' may well be a better way of looking at the contrasts between what are usually termed 'rural' and 'urban' although the impact of the modern mass media, particularly television, make these substituted terms hardly more appropriate.²⁴ It is the direction of orientation that matters and one feels that terms like 'inward orientation' and 'outward orientation' are preferable to the rather meaningless 'local' and 'national' dichotomy. Indeed the most useful concept to introduce is that of Melvin Webber's 'nonplace urban realm'—'an urban realm is neither urban settlement nor territory, but heterogeneous groups of people communicating with each other through space.'²⁵ Everyone participates in

²² R. E. Pahl (1968) 276

²³ R. E. Pahl (1968) 293

²⁴ J. H. Johnson (1963) *Urban geography, an introductory analysis* 142-3 (London)

²⁵ M. M. Webber (1964) *Urban place and nonplace urban realm* in M. M. Webber et alia (1964) *Explorations into urban structure* 116 (Philadelphia)

different realms and shifts from one to another 'This is, of course, especially true of the highly specialized man who may turn from a transatlantic phone call to arbitrate an intra-office personnel problem, then read his mail from customers in various places, then join other motorists in the peak-hour rush, before reassuming his roles as parent, newspaper reader, and member of a friendship circle'²⁶ Webber goes on to assert that no urban settlement is a unitary place but a part of an array of shifting and interpenetrating realm spaces. In this interpretation the conflict in the rural-urban fringe is between the limited realm participation of the rural or local population and the large range of realms in which the immigrant participates. Nevertheless, the intensely 'local', or an 'inward orientation', or limited realm participation can be found lodged in the city centre in the urban village, or in the mining village, 'the 'national' outlook or 'outward orientation' and, above all, wide ranging realm participation can be found in the semi-rurality of the city fringe. Even so this does not destroy the concept of the fringe areas as those where this conflict of orientation is particularly acute, even if one is in danger of ascribing derived social patterns to geographical milieu'

Writing in 1967, Harold Mayer identified problems of competition for land and preservation of open space as the two most important areas of research interest in the rural-urban fringe.²⁷ They are certainly of relevance, although the differences in planning legislation would make studies carried out in the USA and the UK very different. But to a large extent they are detailed aspects of a larger problem, the way in which a city expands at its fringes and the process by which land is taken into the city area and the mechanisms of decision which concern that process.²⁸ Together with this go the social processes which underpin extension and the characteristics of the behaviour of populations at the fringes.

Notes on further reading

Two most useful recent books are

JOHNSON, J. H. editor (1974) *Suburban growth: geographical processes at the edge of the western city* (London)

MASOTTI, L. H. and HADDEN, J. K. editors (1973) *The urbanization of the suburbs* *Urban Affairs Annual Reviews* 7

²⁶ M. M. Webber (1964), 118

²⁷ H. Mayer (1967) *A survey of urban geography*, in P. M. Hauser and L. F. Schour editors (1967) *The study of urbanization*, 99 (New York)

²⁸ For an excellent study of the London fringes see D. Thomas (1970) *London's Green Belt* (London)

The first of these is primarily concerned with the United Kingdom but with some references to European areas the second with the United States. They both have useful bibliographies.

For the rural urban fringe as part of the city, the works providing definition and comment are

- KURTZ R A and EICHER J B (1958) Fringe and suburb: a confusion of concept (see footnote 2)
 MYERS R B and BEEGLE, J A (1947) Delineation and analysis of the rural urban fringe *Appl Anthropol* 6, 14-22
 PAUL, R E (1965) Urban in rural: The metropolitan fringe in Hertfordshire (see footnote 11)
 WEHRWEIN, G S (1942) Rural urban fringe *Econ Geog* 18, 217-28.
 WISSINK, G A (1962) *American cities in perspective, with special reference to the development of their fringe areas* (see footnote 3)

The papers by Whitehead referred to in chapter 8 are also relevant.

The literature on 'suburbs' as distinct from the fringe is extensive.

- CARVER H (1962) *Cities in the suburbs* (Toronto)
 DOBRINER, W M, editor (1958) *The suburban community* (New York)
 DOBRINER, W M (1963) *Class in suburbia* (Englewood Cliffs, N.J.)
 DOUGLAS H P (1925) *The suburban trend* (New York)
 GANS H J (1962) Urbanism and suburbanism as ways of life, in A M Rose, editor (1962) *Human behaviour and social processes* (Boston)
 GANS H J (1967) *The Levittowners* (New York). The references include Gans's extensive work on suburban themes.
 HARRIS C D (1943) Suburbs *Am J Sociol* 49, 1-13
 SCHNORE, L (1965) *The urban scene* (New York). This includes reference to Schnore's wide range of publications on this topic.
 SPECTORSKY, A C (1955) *The exurbanites* (New York).

Material on the rural urban continuum was introduced in chapter 2 but the following which are related to the notion of the dispersed city should be consulted.

- BURTON T (1963) A restatement of the dispersed city hypothesis (see footnote 18)
 STAFFORD H A JR (1962) The dispersed city *Prof Geogr* 14, 8-10
 WEBBER M M (1964) Urban place and nonplace urban realm (see footnote 20)

A book dealing with a specific problem is

- THOMAS D (1970) *London's Green Belt* (see footnote 28)

while problems of planning are usefully considered in a book which has excellent short studies of major cities.

- HALL, P (1966) *The world cities* (London)

For a popular recent work on the whole topic of city fringes see

- MASOTTI, L H and HADDEV, J K (1974) *Suburbia in transition* (New York)

13 THE LOCATION OF INDUSTRY IN THE CITY

It is perhaps surprising that there are fewer studies which seek to generalize the pattern of industrial land-use in the city, than for most other types of use. This is probably due to the concern of research in locational analysis with the larger problems of a regional scale rather than with the intra-urban scale, and also to the intractable nature of the problem itself since such a wide universe of activities is included even under the restricted definition of 'manufacturing industry'. To this the conventional division into heavy and light makes no useful contribution.

It has already been noted that E. W. Burgess identified a zone which was described as being dominated by working class homes and heavy industry.¹ This was largely the product of historical forces and relevant to the earlier part of this century. The rapid growth of industry during the nineteenth century meant that it took up a location, when associated with pre-existing towns, outside and on the margins of the old nuclei. This resulted, in some cases, in the neat concentric zone envisaged by Burgess, as for example in Cologne prior to the Second World War.² The construction of defensive walls on an even site had constricted the city into a series of zones while the area *non aedificandi* outside the 1880 defences was preserved as a green belt. Outside this the large industrial developments of the latter part of the century took place, since they were barred from the river frontage for military reasons. Along with them were built the industrial suburbs to produce a classical zonal pattern (figure 13-1). The main industrial areas themselves were associated with the main radial railway lines, whilst the working class residential areas filled in the areas between.

In contrast to the arrangement exemplified by Cologne, most of the towns which were created by industry, and had no previous existence, grew around the *formative elements*, the *factory* and the *mine*. In consequence multiple nuclei schemes tended to emerge, as suggested by Harris and Ullman.³ The point location of exploited resources produced a number of nuclei in relation to which the residential areas

¹ See chapter 9, page 173.

² R. E. Dickinson (1951) *The west European city*, 81-90 (London).

³ See chapter 9, page 186.

were disposed. These often coalesced (the origin of the concept of conurbation) to form urbanized areas dominated by the separate

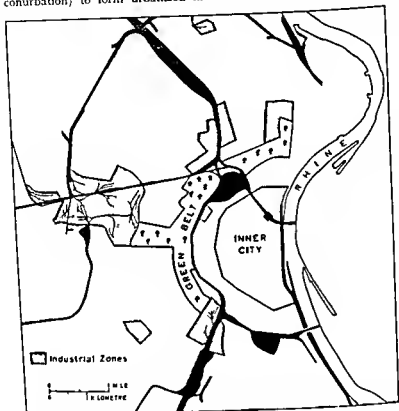


Figure 13-1 The industrial areas of Cologne in 1939
Adapted from R. E. Dickinson (1951) The black areas indicate railways and goods marshalling yards. Areas to the east of the Rhine have been excluded.

nuclei and often in the process creating another, the central business district. A good example of this is Merthyr Tudful⁴ in South Wales where four early ironworks established between 1750 and 1790

⁴ H. Carter (1968) Urban systems and town morphology, chapter in E. G. Bowen, H. Carter and J. A. Taylor, editors (1968) *Geography at Aberystwyth*, 229-33 (Cardiff)

created four distinct nuclei, while the central area emerged as the fifth (figure 13.2)

But these schemes are at the most general level of interpretation and it is in progress from that stage that comparatively little has been accomplished. Four attempts, by Isard, Loewenstein, Hamilton and Pred can be considered in turn and in conclusion some attempt can be made to establish what ground there is in common.

In his volume *Location and space economy* Walter Isard⁵ presented a diagram which purported to represent urban land use patterns. The city is viewed as using localized raw materials and ubiquitous raw materials or none at all. Industries using ubiquitous materials are extremely important within the city, but are linked either with the central area or with all industrial areas since their locational requirements are less stringently defined. These apart, all other industries, implicitly using localized raw materials, are seen to be concentrated in one of several industrial areas which are accordingly characterized by certain industrial associations. These areas are located, it would seem from the diagram, after the arrangement proposed by Burgess. They surround the central area and are in turn surrounded by the less densely developed suburbs. They do not form a continuous zone, however, but constitute a series of sectors within such a zone. Isard based his assessment on intuition, logical and analytical principles relating to the interaction of general forces governing land use, and facts.⁶ His 'model' adds little to previous ideas other than the refusal to use a heavy/light division of industry and an attempt to use raw material sources as a basic divide between centrally and non-centrally located industry.

A survey based on a wider array of empirical evidence is that by Loewenstein⁷ where manufacturing uses were considered alongside a number of other characteristic uses. A selection of cities was examined in which a particular use, as demonstrated by employment, was dominant. 'Only that employment in which a particular city excelled was reproduced from the basic land use maps'⁸ onto a standard format consisting of five distance rings (figure 13.3). From this evidence, synthesized into one map representing manufacturing land uses in total, it was concluded that 'manufacturing activities typically tend to be dispersed away from the core'⁹ and to have a linear appearance due to extension along transport lines. This dispersal away from the core Loewenstein explains in a conventional way as the consequence of the

⁵ W. Isard (1956) *Location and space economy* 278-9 (New York)

⁶ W. Isard (1956), 282

⁷ L. K. Loewenstein (1963) The location of urban land uses, *Ld. Econ.* 39, 406-420

⁸ L. K. Loewenstein (1963), 403

⁹ L. K. Loewenstein (1963) 413

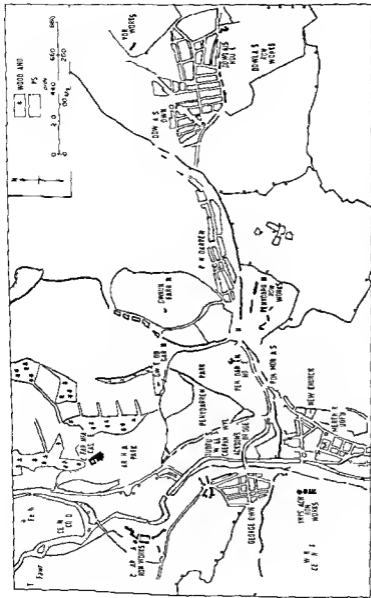


Figure 13.2 Merthyr Tydfil in 1850. The separate industrial nuclei can easily be distinguished. To the northwest lay the Cyfarthfa Works, to the east the Penydarren Works and the Dowla's Works. The fourth southern nucleus is not shown on this map. The old village was located on the extreme southern edge of the map and new developments in a church and market hall (M) indicate the growth of the industrial town. This is an admirable example of a multiple nucleus layout on

high costs and congestion in the theoretically optimum location in the city centre. There are also a number of other factors

- 1 Labour- or market oriented firms are likely to be found in the city centre. This is because market oriented firms, such as those engaged in newspaper publication, can save in terms of transport costs since distribution from the centre is much easier, whilst labour-oriented firms can draw effectively from a central location on the widest ranges of skills.
- 2 Manufacturing plants which are engaged in what Loewenstein calls organized, integrated industries, cluster along radial and belt railroads and highways.¹⁰ This is particularly true of assembly industries such as the automobile industry.
- 3 Large, basic processing industries such as petroleum refineries or steel mills require large areas and create a great deal of noise and pollution. They therefore, repel residential development and will be removed from it. This is only partly true, certainly high quality residential areas are unlikely to develop adjacent to heavy industry but historically this is by no means true of working class residential areas.
- 4 Large new plants are often located in a suburban context where land is most easily and cheaply available.

This is not a very impressive breakdown of industrial distribution but it does illustrate the point which neither Burgess nor Isard make clearly. Industry is not confined to any one zone or any series of areas, it is located throughout the city because different types require different locational attributes so that any attempt at generalization, unless linked to a convincing typology, becomes extremely hazardous.

This can be illustrated from Loewenstein's own work. He calculates for each use an index of concentration.¹⁰ This measures the percentage distribution of land use of each of the activities, such as retail or manufacturing, in each of the five rings as a percentage of the total land area within that ring. In the computation of the index the percentage of the total land was accumulated and multiplied by the amount of land in a particular use. The formula is defined as

$$\text{Index} = 1 - \sum (V_i - A_{i-1}) (I_i + I_{i-1})$$

where I_i is the accumulated proportion of total area through the i th ring (the fifth if the whole city is under survey) and A_i is the accumulated proportion of the area for the given kind of employment activity,

¹⁰ L. H. Loewenstein (1963), 418. The derivation of the index is discussed in detail here.

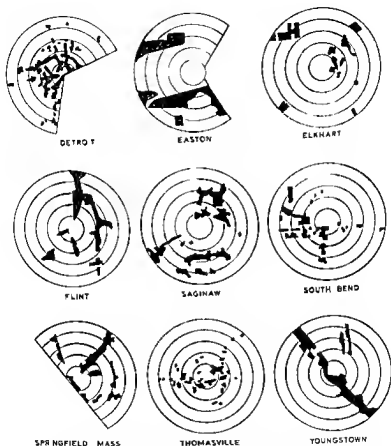


Figure 13-3. The distribution of manufacturing in selected American cities *After L. K. Loewenstein (1963)*. The areas in black denote manufacturing land use. Five distance rings are superimposed in each case by taking the major CBD intersection as centre and drawing an outer ring at the mean limit of the metropolitan area. The radius of this outer ring is divided into four to give the circles shown.

ie for a given type of use. Table 13-1 illustrates the computation of the index of concentration for public administration. The index varies between -1.0000 for a complete dispersal, through zero for even distribution throughout the rings to $+1.0000$ for complete concentration. An analysis of the results reveals that manufacturing had the lowest index of 0.2800 compared with 0.6896 for finance, insurance and real estate, 0.7344 for retail and 0.4816 for personal service and

table 13-1. Computation of Loewenstein's (1963) index of concentration for public administration

Ring	Total area			Public administration			Product of (3) x (6)
	Proportion of total area in ring	Cumulation of (1) (Y_i)	2 Point total of (2) ($Y_i + Y_{i-1}$)	Proportion of total public administration in ring	Cumulation of (4) (X_i)	2 Point difference of (5) ($X_i - X_{i-1}$)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	0.04	0.04	0.04	0.84	0.84	0.84	0.0256
2	0.12	0.16	0.20	0.24	0.88	0.24	0.0480
3	0.20	0.36	0.52	0.07	0.95	0.07	0.0384
4	0.28	0.64	1.00	0.05	1.00	0.05	0.0500
5	0.36	1.00	1.64	0.00	1.00	0.00	0.0000
Total	1.00	—	—	1.00	—	—	0.1600

Index of concentration = $1 - \text{Total column (7)} = 1.0000 - 0.1600 = 0.8400$

the 0.8400 for public administration as shown in table 13-1. Manufacturing showed the least tendency to concentration and the highest tendency to an even distribution throughout the city of all the uses considered. One example (Elkart Ind.) even shows a minus index of -0.0352 , the only occurrence, which demonstrates a tendency towards complete dispersal.

The various characteristics of intra urban industrial location derived by Loewenstein are reflected in Hamilton's attempt,¹¹ in considering models of industrial location, to reduce the map of London's industry to a generalized scheme (figure 13-4). On this four characteristic locations are identified:

- A. Central locations. These are taken up by industries which require access to skilled labour, for example instrument making to the CBD, for example the clothing industry, and to the whole urban

¹¹ F. E. J. Hamilton (1967) Models of industrial location, chapter 10 in R. J. Chorley and P. Haggett, editors (1967) *Models in geography*, 361-417 (London).

market for distribution, for example, newspaper publishing. It is in this context that the swarming of closely associated activities occurs which gives rise to sharply defined industrial quarters.

B Port locations

C Radial or ring transport artery locations. Both these (B and C) are taken up by larger enterprises seeking cheaper land in larger quantities and good locations for assembly and distribution. In

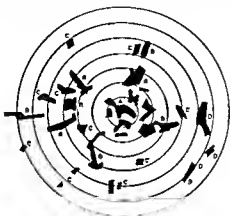


Figure 13-4 A model of the spatial industrial structure of a metropolis. After F. E. Ian Hamilton (1967). This is based on a map of industrial areas in London. The four categories shown are: **A** central locations; **B** port locations; **C** radial or ring transport artery locations; **D** suburban locations.

addition, larger amounts of unskilled or semiskilled labour can be obtained without calling on city-wide sources.

D Suburban locations. Such positions are sought by industries requiring very large amounts of land for assembly or production lines and for storage, or if the industry has repellent features such as fumes or noise, which compel it to seek isolation from residential areas.

The interpretation of this pattern is presented in the context of the conventional explanatory factors. 'If the metropolis is large, then substantial cost differentials exist between alternative locations within the city, especially with regard to land, labour and transport. The

model of the metropolitan spatial structure of industry, therefore, comprises differing localizations of associated industries in different optimum conditions.¹² This sounds perilously close to a sophisticated version of the schoolboy's answer that a cultivated plant under consideration occurs in the 'best soils' and 'most suitable' climate! There is clearly a very close parallel between the generalizations of Loewenstein and Hamilton.

Finally Pred has presented an array of what he terms seven flexible types of manufacturing each of which he argues should be characterized by a distributional pattern with a unique set of attributes, including in some cases randomness.¹³ Pred adopts the rationale derived from Chinitz's study of industrial plants in the New York Metropolitan Area. Chinitz proposed three broad types

- 1 Those serving markets predominantly local
- 2 Those serving national markets. Subdivided by size and value of product
- 3 Those plants localized by external economies and not included under 1 and 2

Pred writes 'since each type and subtype has different transportation requirements, or different abilities to absorb transport outlays, singular, but not exclusive, locational tendencies emerge'.¹⁴ This is comparable to Hamilton's statement above, but made in relation to a useful subdivision of industries which to some extent reflects Isard's earlier basis but with an emphasis on markets rather than on raw materials. Pred's seven types are as follows.¹⁵

- 1 Ubiquitous industries concentrated near the CBD
These are industries whose market is coextensive with the metropolis. They often have linked wholesaling functions and can maximize distribution from the centre. Pred quotes bread, cake and pie plants as an example.
- 2 Centrally located 'communication-economy' industries
In these cases locations are determined by external economies derived from immediate accessibility to the purchaser prior to the process of manufacturing. An obvious example is job printing where the most frequent demand arises in the city centre and where face-to-face contacts are necessary. Pred characterizes the New York garment centre as archetypal.

¹² F. E. I. Hamilton (1967), 408.

¹³ A. R. Pred (1964) 'The intra metropolitan location of American manufacturing', *Ann Assoc. Am. Geogr.* 54, 165-80.

¹⁴ A. R. Pred (1964) 173.

¹⁵ A. R. Pred (1964) 174-80.

- 3 Local market industries with local raw material sources
Within this group are industries producing for the local market and using ubiquitous raw materials, such as ice manufacturing plants, and also those using raw materials which are the by-products of other industries or semi finished goods. These often appear to have random locations since the constraints operating on site selection are not great, even nearness to railheads is not vital where intra-urban access is required. The building of freeways has resulted in some dispersion of these industries presumably this should also influence those in group 1
- 4 Non local market industries with high value products
Where the market is greater than the metropolis and where the finished product has a high value-to-weight ratio then transport costs become relatively unimportant and a random location pattern can result. Fortuitous factors can govern site selection. A typical example is the manufacture of calculating machines. Other things being equal these industries will tend to locate near the CBD especially the smaller firms
- 5 Non centrally located 'communications-economy' industries.
Pred defines these as 'those industries which imperatively eluster in non central locations to realize 'communication economies''¹⁶ He suggests that these are highly technical industries which need to cluster to keep abreast of innovation but are nationally oriented and hence not related to the CBD in any specific way. This results in strip development along major expressways and space age electronic industries are exemplars
- 6 Non local market industries on water fronts
This is a well known group of port industries and requires no comment other than to make the reservation that all industries on waterfronts do not necessarily belong to the group
- 7 Industries oriented toward the national market
These have extensive markets with locations strongly influenced by the bulk of the products and transport rates. The main point that Pred makes is that these locations often show distinct biases in the sector of the city in which they are located which is characterized as one looking toward the regional or national market

At the beginning of his study Pred set out to answer two questions. What kinds of industry remain in or near the core of the metropolis? What patterns if any, are to be distinguished among the decentralized industries? ¹⁷ He answers the first question with some success but makes

¹⁶ A. R. Pred (1964) 177

¹⁷ A. R. Pred (1964) 170

little headway with the second¹⁸ and indeed admits 'a considerable amount of evidence remains to be culled before any real understanding of intrametropolitan locational preference of industries oriented to wards non local markets is attained'¹⁹ The examples which he uses are mainly derived from San Francisco and to some extent the characteristic types and locations are representative of that metropolis rather than general in concept. But it is evident that there is a great deal in common between the suggestions of Loewenstein, Hamilton and Pred and the three formulations can be put together as follows

- 1 *Centrally located industries*
 - a Labour-oriented
 - b Market oriented—This includes the two categories of ubiquitous industries and local market industries proposed by Pred
 - c CBD-oriented—This includes Pred's 'communications-economy' industries
- 2 *Non local market high value industries* These tend to have random locations
- 3 *Large basic processing industries* these take in Pred's last group which are nationally oriented. Although suburban locations are ideal since the problems caused by noise and pollution can be minimized, many of these, especially chemical and metallurgical industries, have heavy investments in plant in the older inner areas of cities and remain there near to the location propounded by Burgess. Certainly all three schemes tend to underemphasize this group and Pred's notion that it is located on the side of the city facing its markets is an interesting one and worthy of empirical investigation but it says little about basic location in relation to the rest of the city
- 4 *Water front or port industries*
- 5 *Integrated industries along communication lines* These would include Pred's 'Non centrally located "communications-economy" industries'
- 6 *Suburban industries* the product of the process of decentralization

This list is far from convincing and to some extent sacrifices the consistency in classification which Pred introduced. It does, however, emphasize that industry can be found in every zone and sector of the

¹⁸ For one of many studies of the decentralization of industry see E. A. Kitagawa and D. J. Bogue (1955) *Suburbanization of manufacturing activity within standard metropolitan areas* Scripps Foundation for Research in Population Problems, Miami University

¹⁹ A. R. Pred (1964), 180

- KITAGAWA, E M and BOGUF, D J (1955) *Suburbanization of manufacturing activity within standard metropolitan areas* (see footnote 18)
- LEIGH R (1969) Analysis of the factors affecting the location of industries within cities *Canadian Geogr* 13, 28-33
- LOGAN, M I (1966) Locational behavior of manufacturing firms in urban areas (see footnote 21)

A further study which should be consulted is

- GROVES, P A (1971) Towards a typology of intrametropolitan manufacturing location *Univ of Hull Occ Papers in Geog* 16

For further material on particular areas

- DWYER D J and LAI CHUEN YAN (1967) The small Industrial Unit in Hong Kong: Patterns and Policies *Univ Hull Dept Geogr Occas Pap* 6
- GOTTMANN, J (1961) *Megalopolis* (Cambridge Mass)
- HALL, P G (1962) *The industries of London since 1861* (London)
- HOOVER, E M and VERNON, R (1959) *Anatomy of a metropolis* (Cambridge Mass)
- MARTIN, J E (1966) *Greater London: an industrial geography* (London)
- MOYES, A (1971) *Post war changes in the distribution of employment and manufacturing in North Staffordshire* (University of Keele unpublished M A thesis)
- WISE, M J (1949) On the evolution of the jewellery and gun quarters in Birmingham *Trans Inst Brit Geogr* 15, 57-72. A dated but classic study

14 THE RELATION BETWEEN FUNCTION AND FORM IN URBAN GEOGRAPHY

It is one of the major weaknesses of urban geography that there has been a clear divorce between the study of form and function, between the study of the town as area and the town in area. That these are interrelated is so obvious as to need no elaboration but convenience in academic studies, as well as the necessary reduction of complexity in analysis, have resulted in their separation. It is true that conventional studies of town plan usually include sections on the stimuli to growth,¹ a feature implicit in the term 'morphogenetic phase'. It is equally true that some studies of urban functions have included sections on the intra urban location of the establishments being used as criteria.² But it is seldom that these investigations are pursued with vigour as a direct purpose of enquiry.

There is one clear exception to this general situation where a particular concentration of work is discernible and this is in relation to the identification of a hierarchy of shopping centres within the large city. Such studies are at once related to the functional notion of a hierarchical and regular spatial arrangement of business centres and at the same time to the emplacement of these centres within the context of the city, for the subsidiary business districts were ignored by Burgess and Hoyt and receive but little detailed attention from Harris and Ullman.³

The earliest studies made of subsidiary business districts were not linked with central place ideas but were derived from empirical observation of city structure. The most widely known were by M. J. Proudfoot who identified five types of retail structures within the cities of the United States.⁴ These he defined as

1 The CBD

2 The outlying business district

¹ This is true for example of M. R. G. Conzen's study (1960) Alnwick, Northumberland: a study in town plan analysis *Trans Inst Br Geogr* 27.

² A good example of this can be found in G. Rowley (1968) *The middle order towns of Wales* (Univ. Wales, Unpublished Ph.D. thesis).

³ See pages 172-88.

⁴ M. J. Proudfoot (1937a) City retail structure *Econ Geogr* 13, 425-8 (1937b) The outlying business centers of Chicago *J Ld Pub Util Econ* 13, 57-70.

- 3 The principle business thoroughfare
- 4 The neighbourhood business street.
- 5 The isolated store cluster

Proudfoot noted that these displayed a 'progressive change' clearly indicating that he was identifying a ranked structure although making no link with the then nascent and little known central place theory. Similar empirical studies continued to be made with ranked structures generalized from the observed situation in the real world. Thus W. Burns in his book *British shopping centres*⁵ published in 1959 outlined a similar structure which he described as 'commonly accepted' at that time and called a four tier system, excluding 'the corner shop'. This was

- 1 The town centre (the equivalent of the CBD)
- 2 District centre
- 3 Neighbourhood centre
- 4 Subcentre

In addition Burns introduced a diagram (figure 14-1) which clearly indicated a nesting arrangement. His main concern was to further reduce the complexity of this by advocating a three tier system and, although without demonstrating any real understanding of the operation of threshold and range controls, Burns based his work on the arguments commonly employed in central place studies. He saw convenience as the major control and interpreted it through frequency of visits, contrasting frequent or daily needs with periodic or weekly needs and special or less than weekly needs. Also considered was 'selectivity' by which the individual exercised choice by other than 'convenience' measures, involving personal characteristics such as cleanliness or willingness to offer credit or status value. Burns in this way included those aspects of consumer behaviour which have only more recently been considered in a central place context.

Given the rapid development of central place notions, the growing number of empirical works being published and the existence of studies which identified ranks of business districts within the city, it was inevitable that the two lines of research should be brought together and the attempt made to see in the types of business districts the equivalence of ranks in the general urban hierarchy. Hans Carol writing of his work on Zurich claims, 'When this survey was begun in 1902, it was, to my knowledge, the first attempt to use the central place concept for analysing the pattern of central functions within

* W. Burns (1959) *British shopping centres* (London)

the city' ⁶ Carol recognized that distinctions in level were not simply related to numbers of shops but also to the variety of goods available for sale at a centre and the quality (price) range within each good (figure 14-2a and b) The extent of the service area was also

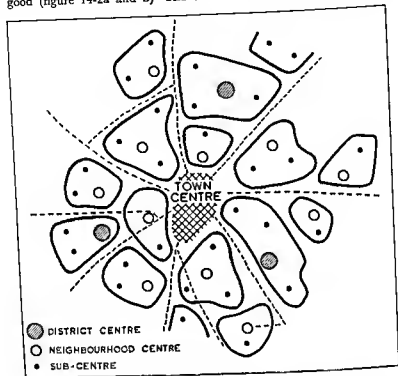


Figure 14-1: The four-tier system of intra-urban shopping centres *After W Burns (1959)*

considered From a survey of three centres of different 'levels' a hierarchical classification was derived which recognized four ranks of centre

- 1 CBD Serving the whole city
- 2 Regional business district Offering middle order goods (see figure 14 2a and b) and serving some 90,000 to 100,000 population.

⁶ H Carol (1960) The hierarchy of central functions within the city *Ann Assoc Am Geogr* 50, 419

- 3 Neighbourhood business district. Offering low order goods, frequently needed and with a very limited range of higher order commodities. Such districts were usually situated towards the periphery of the city and served some 5,000 to 10,000 people.
- 4 Local business district. 'A cluster of a few round the-corner shops'.

In spite of the differences in nomenclature there is a clear equivalence to the four tier system which Burns discussed but with the beginnings of some rigour being injected into the study of these various levels. This was further advanced in the work of W. Garrison and others.⁷ In this it was pointed out that much of the existing work was intuitive and based on the conventional distinction between 'convenience', 'shopping' and 'speciality' goods. A survey of definitions indicated the variety of different bases used to identify the ranks of centre which have been so far indicated in this chapter. In addition Garrison emphasized the additional problem of string streets which were much more apparent in an American context. A study of Spokane, in which 49 business types located in 285 business centres were identified, was undertaken by means of a 49×49 correlation matrix of business types. By means of linkage analysis a series of nine groupings of businesses was derived and linkage analysis again applied to a 9×9 matrix of the average correlation for each group of business types. The result was a clear distinction of a nucleated component made up of three groups, which were given no distinctive names, and an arterial component with an automobile set, a supplies set and a string street set. This was undoubtedly the first study to demonstrate the contrasting characteristics of these subsidiary business districts in statistical terms and also to make the link with a wider country area. 'It is readily evident both empirically and theoretically that nucleated shopping centres within urban areas (densely built up areas with concentrated purchasing power) and alternate nucleated urban centres (nucleations in the otherwise more sparsely populated areas of less concentrated purchasing power) are of the same nature'.⁸ It also follows that intra urban business districts are not only to be found found within large metropolitan centres. If a small town has a central shopping array equal to that of the neighbourhood business district using Carol's terminology then it will be possible to identify local business districts, at the lowest level, within the urban area. The intra-urban arrangement of business districts is not a problem related solely to the large city.

⁷ W. Garrison *et alia* (1959) Empirical verification of concepts of spatial structure Chapter 4 in *Studies of highway development and geographic change* 67-99 (Seattle)

⁸ W. Garrison *et alia* (1959), 99

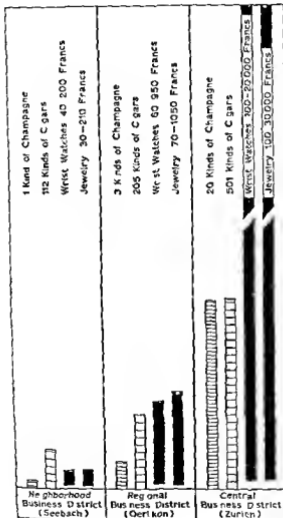


Figure 14-2A: The range of goods in business districts at three different levels. This indicates the variation in the range and quality of similar goods at different levels of the hierarchy

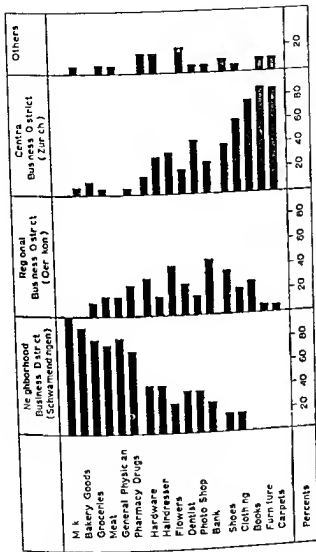


Figure 14-2B The percentage of shopping trips made by persons residing in a Zurich suburb (Schwamendingen) to three levels of business districts. This indicates the differing orders of goods which are bought at the differing centres *After H. Carol (1960)*

The reference above to Carol's terminology indicates one of the problems in these studies, the variety of nomenclature employed for the subsidiary districts. To a large extent this has been solved by the summary work of Brian Berry who, drawing on work such as Garrison's, has outlined a complete typology of the commercial characteristics of

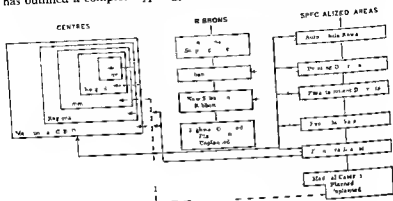


Figure 14-3 A typology of business districts After B J L Berry (1962)

American cities outside the CBD* (figure 14-3) This is based on a threefold division of these areas into

- 1 A hierarchy of business centres
- 2 Highway-oriented commercial ribbons and urban arterial commercial developments
- 3 Specialized function areas

Centres

Ribbons

Specialized areas

The hierarchy of centres includes four ranks below the CBD, thus adding one to the pattern already identified, largely it would seem by splitting the regional level into two and calling the lower segment the 'community centre'. This presumably provides a parallel to the five ranks of town within a central place system which Berry indicates—hamlet, village, town, city and regional capital. Indeed Carol set out this equation quite clearly (table 14-1).¹⁰

* B J L Berry (1962) *The commercial structure of American cities, a review: Community Renewal Program (Chicago)*, see also Berry's (1967) *Geography of market centres and retail distribution*, 46 (Englewood Cliffs, N.J.)

¹⁰ H Carol (1960)

table 14-1: Hierarchies of centres *After Carol (1960)*

USA	Switzerland	Centres of Zurich	Centres - American cities
Hamlet	Dorf	Local business district	Local centre
Village	Markt Ort	Neighbourhood BD	Neighbourhood centre
Town	Stadt	Regional BD	Community centre
City	Grosse Stadt	CBD of Metropole	Regional centre
Metropolis	Metropole (Zurich)		CBD of metropolis

Under the broad heading of 'ribbons' a number of differing types is identified. The first is the well established shopping street which usually leads from the nucleated centre or is substituted for the lower order centres. The second is the highway-oriented ribbon which is ubiquitous in the USA but very much less common in Europe largely due to a less intensive use of the automobile and the more effective application of planning controls. It consists of a characteristic and garish assembly of motels, filling stations and restaurants. The third type, the urban arterial locations, is made up of stores with excessive space requirements, such as furniture or appliance stores, building and lumber yards. They rely on special purpose trips and can concentrate on providing easy access along the arterials together with good parking facilities, rather than associating with other business in the central area. The specialized areas are often closely associated with the nucleated business district and provide grouped but specialized services, such as medical districts with associated doctors, dentists, opticians and pharmacists.

It would seem that although there is some discrepancy between the five ranks of business district and the ranks of city often identified, nevertheless here is a definitive statement of typology. Unfortunately there are two difficulties which arise once a locational study of these centres is considered. The first of these is derived from the social contrasts within the city which have been considered in chapter 11. These mean that purchasing power is not evenly spread over the city and consequently demand generated is also not evenly spread. At the same time population densities vary as do shopping habits. In a 'working class' area in Britain, where the family does not own a car or a refrigerator, purchases will tend to be frequent and the 'corner shop' an important element. In the well to-do suburbs of American cities where

car owning is universal and refrigerators and deep freezes ubiquitous, shopping habits will be very different and most convenience goods will be purchased at the weekly visit to the supermarket, so that the corner shop will not exist. The whole situation is further complicated by the fact that the pattern of nesting with discrete tributary areas which is implied by theory is not borne out in practice. People shop around and for a variety of reasons will not necessarily use the nearest centre. This was demonstrated by H. R. Parker¹¹ in Liverpool in 1962 where the detail of bus routes controlled shopping rather than simple physical proximity. Again Ronald Jones has shown that even in a new town, with planned neighbourhoods with their appropriate shopping centres, people do not hold to the anticipated patterns but will move to centres outside their own neighbourhoods.¹² All these factors make neat typologies somewhat suspect, other than as very general subjective guides to the basic structure.

Two studies can be considered in elaboration of the difficulties outlined in the last paragraph. One of the most detailed studies of intra-urban retail nucleations is that by Barry Garner using the area so often worked over in urban studies—Chicago.¹³ Garner faces the first problem of how these nucleations are to be defined in areal terms and proposes an objective method based on land-value profiles which are constructed along the streets which meet at the peak land value intersection. 'The zone of transition between nucleated and ribbon functions is identified on each profile as the point where the curve levels off to form the ridge of value associated with the ribbon'¹⁴ (figure 14-4). For each of the nucleations identified the relations between number of establishments, floor space and number of business types were examined by means of scattergrams. This provided an initial problem in that there were clear deviant cases from regression lines drawn to show relations between pairs of the variables. The location of these deviants suggested an association with the socio-economic status of different parts of the city reflecting basic contrasts in purchasing power. Accordingly Garner was forced to divide his nucleations into two, one associated with low income areas, which he termed 'workingmen's areas' and the other with remaining areas, which he termed 'the rest of the city'. The hierarchy of nucleations was then

¹¹ H. R. Parker (1962) Suburban shopping facilities in Liverpool. *Tn Plann Rev* 33, 197.

¹² R. Jones (1969) Geographical aspects of behaviour within the framework of neighbourhood units in East Kilbride. In *Processes and patterns of urbanisation*, IBG Urban Studies Group.

¹³ B. J. Garner (1966) The internal structure of retail nucleations. *Northwestern Univ. Stud. Geogr.* 12.

¹⁴ B. J. Garner (1966), 191.

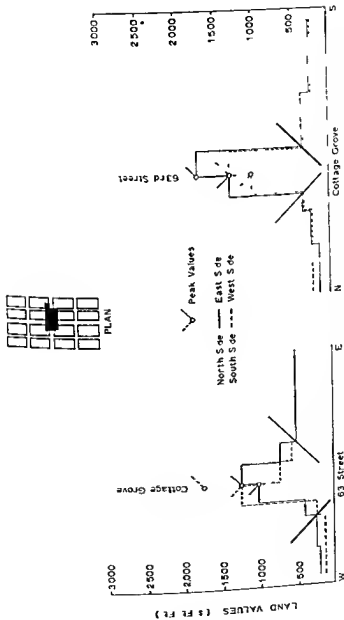


Figure 14-4: A method of areal definition of subsidiary business districts After *B J Garner (1966)*
 The criterion used is land values and the point of marked fall off away from the centre (of Chicago) is identified on each side of each street

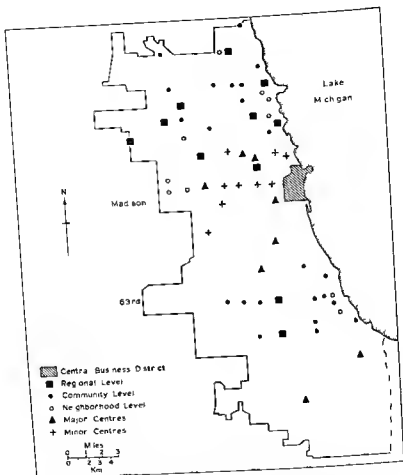


Figure 14-5: The hierarchy of retail nucleations in Chicago, 1961 After *B J Garner (1966)* For comment on the levels identified see text page 337

determined by analysis of the relation between the number of occupied establishments and the number of business types (figure 14-5) This produced three levels which were identified as

- 1 Regional centres
- 2 Community centres
- 3 Neighbourhood centres

in line with the outline proposed by Berry and excluding the lowest order at the 'street corner' level In the workingmen's areas the equivalent scattergram did not reveal clear classes and observations clustered about the regression line By employing nearest neighbour techniques two classes were eventually identified, termed 'workingmen's major' and 'workingmen's minor' Garner makes the interesting comment that 'the classification offered is not the only possible allocation of retail nucleations to various levels or orders in a hierarchy Rather, it may be considered one of several other systems which are dependent upon the methods of analysis and purpose of study'¹⁵ This would seem to suggest that the ordering of the centres is a matter of simple convenience rather than of inherent character His next step is to analyse the spatial distribution of these centres and he concludes that there is little regularity to be found 'In general, nucleations of the same order are not uniformly spaced throughout the study area This is to be expected from the marked unevenness of the population distribution and purchasing power'¹⁶ A relation to a $k = 4$ network is suggested but is so tentative as to be of little use To a large extent this sort of conclusion reflects problems inherent in central place studies in that location patterns tend simply to reflect the distribution of population R J Johnson in an analysis of an intra-metropolitan central place hierarchy in Melbourne¹⁷ related the range of centres (he identified eight grades) to three factors These were variations in residential density, the socio-economic status of the population and the age of development of an area These are clearly not independent variables for there is a close association between them Melbourne was divided into seven areas (area 4 being subdivided in 4a and 4b to distinguish an older and a newer area) on the basis of socio-economic status The areas are shown on figure 14-16 and the results are indicated in table 14 2

¹⁵ B J Garner (1966) 49

¹⁶ B J Garner (1966), 50

¹⁷ R J Johnston (1966) The distribution of an intrametropolitan central place hierarchy in Melbourne *Aust Geogr Stud* IV, 17 33

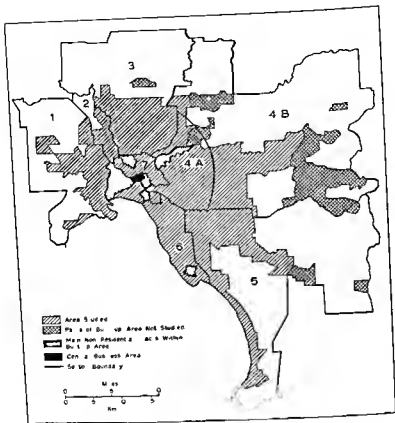


Figure 14-6 The social areas of Melbourne After R J Johnston (1966) This division was based on proportion aged 15-20 in full time education Six sectors were defined and the largest subdivided to recognize older and newer suburbs The social rank is generally in descending order 4A 6 4B 2 5 3 1 7 For a more complex analysis of social areas see F L Jones (1969) (reference on p 303)

table 14-2: Distribution of Melbourne's hierarchy *After R J Johnston (1966)*

Sector	1	2	3	4A	4B	5	6	7	Total
Nucleated centres									
1 1	1	—	2	2	1	2	—	3	11
2	9 1	0	18 2	18 2	9 1	18 2	0	27 3	100
2 1	2	4	4	9	2	8	13	10	52
2	3 8	7 7	7 7	17 3	3 9	15 4	25 0	19 2	100
3 1	3	2	1	7	3	3	7	2	28
2	10 7	7 1	3 6	25 0	10 7	10 7	25 0	7 1	100
4 1	3	—	10	19	3	9	7	10	61
2	4 9	0	16 4	31 2	4 9	14 7	11 5	16 4	100
5 1	3	2	9	8	6	2	6	—	36
2	8 3	6 8	25 0	22 2	18 7	5 6	16 7	0	100
6 1	7	4	11	8	5	8	8	10	61
2	11 5	6 5	18 1	13 1	8 2	13 1	13 1	16 4	100
7 1	18	4	36	17	17	22	24	18	157
2	11 5	3 5	22 9	10 9	10 9	14 0	15 3	12 1	100
8 1	50	12	75	23	40	37	35	40	312
2	18 0	3 9	24 0	7 4	12 8	11 9	11 2	12 8	100
Isolated									
1	182	48	225	82	32	92	98	584	1343
2	13 5	3 6	16 8	6 1	2 4	6 8	7 3	43 5	100
Percentage of total	13 0	3 7	18 1	8 5	5 3	8 9	9 9	33 9	100

Note For each grade of centre row 1 gives absolute frequencies row 2 gives percentages

This evidence confirms the hypotheses advanced by the author¹⁸

- 1 Isolated establishments are highly concentrated in the older high density, low status parts of the city. This is for the reasons indicated already
- 2 Lowest order centres are most common in areas of high population density and adjacent to those parts with an excess of isolated establishments
- 3 With increasing status and decreasing population density centres of the lower orders become less frequent

¹⁸ R. J. Johnston (1966), 21-4

- 4 High status sectors have a top heavy hierarchy
- 5 Low status sectors have a bottom heavy hierarchy
- 6 The central areas show the most balanced situation

At this point it is worth considering a further study, made of Edinburgh by Ronald Jones.¹⁹ Again a careful method of delimiting centres was employed and a classification derived by a scattergram of total floor space in each centre against the number of selected non-convenience types of shop. Four grades (below the Edinburgh CBD) were identified and Grades I, II and III were subdivided into groups *a* and *b* (see figures 14.7 and 14.8). In considering the distribution of these centres Jones notes the way in which the higher grade centres cluster around the CBD. This he argues reflects far more of the city's population distribution of 40 years ago and illustrates the significance of inertia as a factor. The retail distribution has not been adjusted to suburban extension and this is possibly related to the nature of that extension itself by private developers and municipal authorities. This means that in Edinburgh the hypotheses put forward by Johnson as to the distribution of high and low order centres in relation to the city centre do not apply. Jones concludes, 'In terms, therefore, of central place theory, it is difficult to discern any extensive fit between what might theoretically be expected and the actual distribution and hierarchical structure of suburban retail facilities in the city today'.²⁰ Moreover he goes on to question whether this is likely to be the case in Britain and introduces the problem raised by Parker that movement is related to the vagaries of the bus service rather than to simple distance. Moreover given the convergence of public transport towards the city centre then the only location where high grade subsidiary business districts can survive is precisely where they are located in Edinburgh, where the incoming flows begin to converge at these minor, inner nodes. The large outer suburban shopping centre is the product of the privately owned car and a footloose population.

The conclusion from all these studies is not an easy one. The notion of subsidiary business districts conforming neatly to the ranks of the urban hierarchy and disposed according to a hexagonal central place net has clearly to be abandoned. Every study which has been carried out carries the same conclusion and this applies not only to western cities but to non western examples also, as in the study of Calcutta by A. K. Dutt. 'In contrast to Christaller's seven levels of central places,

¹⁹ R. Jones (1967) *Central place theory and the hierarchy and location of shopping centres in a city*. Edinburgh Inst. Br. Geogr. Study Group in Urban Geography.

²⁰ R. Jones (1967) *Aspects of central place theory and the city in developing countries*.

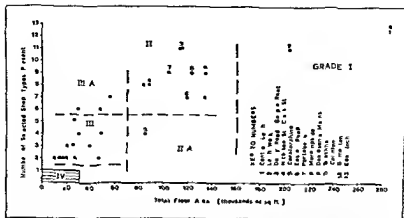


Figure 14-7: The identification of subsidiary business districts in Edinburgh *After R Jones (1962)* The basis is a scattergram of selected non-convenience shopping facilities against floor area. The grades identified are shown. Leith Walk (No 2) is given the grade 1A to separate it from Central Leith. The Edinburgh CBD is excluded.

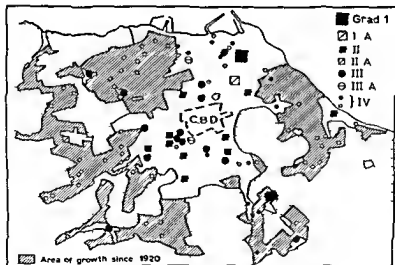


Figure 14-8: The hierarchy of suburban shopping centres in Edinburgh *After R Jones (1967)*

only four such levels exist in Calcutta. The norm of central places in Calcutta is 1 4 18 36 which *does not conform* to any uniform ratio.²¹ The procedure of analysis by ranking of these districts, however is clearly one to be adopted but the explanation of the patterns is likely to be found in the complex of city growth, the segregation of its social areas and in consumer evaluation of the costs and means of travel and of the cheapness or prestige of shops. This brings one back to the point that here those aspects of study which are commonly thought of as morphological are brought into full association with those that are considered functional.

The second line of study concerned with the relation of function and form has had in comparison with the first but little attention. W. K. D. Davies writes: 'Few attempts have been made to study the interrelationships existing between the morphology and function of urban areas either within or between centres.'²² Davies goes on to propose a partial theory of the morphological structure of commercial places. This is based on the fact that any new commercial function locating in a central place can either occupy an existing building, convert the building or destroy the original structure and create a new form. The actual town is the product of several cycles of such a process and in theoretical terms it should be possible to measure the extent and the pace of departure from an original fabric. The whole process is summarized in the model proposed by Davies and shown in figure 14-9. It is perhaps proper to note that this devolves into a study of building form or architecture rather than of the conventional morphological elements of street plan and building plot but these could easily be taken into the model. The critical point is that it is seldom possible to designate an 'original fabric from which departure can be measured, in any satisfactory way. Here Davies is able to develop his study by looking at an area where there was a widely spread, uniform base in the two storey terrace house of Pennant Grit which was so ubiquitously erected in the Rhondda and neighbouring valleys of South Wales largely after the Public Health Act of 1875 and its local adoption. Changes from this simple base can be measured for, as the demand for retail facilities emerged, the terraces at nodal locations were transformed into shopping centres. Each building is examined according to four main components—number of storeys, building materials (Pennant Grit), building style (terrace) and sign of commercial activity and points are awarded according to a measure of departure from the

²¹ A. K. Dutt (1969) Intra city hierarchy of central places: Calcutta as a case study. *Prof. Geogr.* 21: 18-22.

²² W. K. D. Davies (1968) The morphology of central places: a case study. *Ann. Assoc. Am. Geogr.* 58: 93.

norm of a two storey, terrace house of Pennant Grit with no commercial use²³ The points are summed block by block and a map can be produced illustrating the degree of change (figure 14-10) The total score for any centre can be compared with its score on a functional measure and Davies shows the close relation between the two, although some detailed discussion is necessary in elaboration It is understandable that Davies records that the culmination of change is represented by the largest town of the area 'Yet within each centre constant reference has been made to difference between the core of the central area and the remainder of the zone Indeed, it seems that whilst the hard core of the commercial area represents its highest achievement in morphological complexity, the rest of the centre takes over the character of the core of the next lowest order centre'²⁴ Here Davies is making the same point as Garner was elaborating at the same time, but in the context of his functional study, of the internal structure of retail nucleations²⁵ Garner demonstrated that owing to the standard forces operative in competition for central land the shops selling higher order goods dominate the centre and those selling lower order goods are

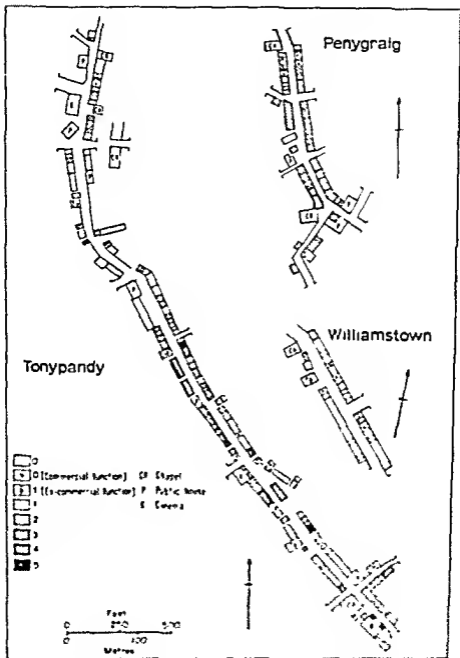
²³ W K D Davies (1968) 96

²⁴ W K D Davies (1968)

²⁵ B J Garner (1966), 97-124

Figure 14-10 The morphology of three Rhondda (South Wales) settlements After W K D Davies (1968) The shadings indicate the scores of buildings according to the degree of conversion from the basic two storey terrace of houses in Pennant grit The scoring is as follows

	<i>Principal components</i>	<i>Detailed elaboration</i>	<i>No of points allocated</i>
A	Number of storeys	1 2 Storeys	0
		3 Storeys	1
		4 Storeys	2
B	Building materials	Pennant grit	0
		Brick or other material	1
C	Building style	Terrace style	0
		Other styles (ie non terrace styles)	1
D	Sign of commercial activity	No morphological alteration	0
		Ordinary shop front (large wooden frame)	1
		Modern shop front (modern conversion in wood or stone)	2



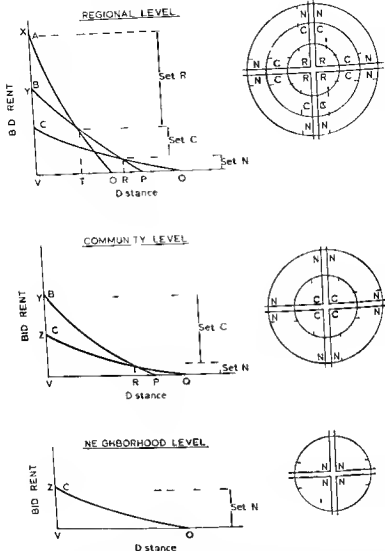


Figure 14-11 The structure of intra metropolitan business districts *After B J Garner (1966)* The three graphs are equivalent to those which were used in figures 9.6 and 9.7 on pages 195-6. In these cases A, B and C represent Regional, community and neighbourhood business types respectively. The presence and distribution of businesses of these various orders is shown by R, C and N respectively on the diagrams which represent the regional, community and neighbourhood levels.

relegated in turn to successively distant zones (figure 14-11). This is in keeping with the analysis considered earlier on urban land uses in general.

Reference to general land use patterns shifts attention to a further attempt to relate form and function, this time at the margins of the business district. Whitehand, for example, has sought to demonstrate the association between the morphological concept of the fringe belt and the functional notion of rent gradients.²⁶ Reference was made to this work in chapter 8 (p. 152) and there is no point in repetition here, but the extension of form-functional studies to the fringe-belt areas is particularly useful and, as Whitehand notes, provides the opportunity of bringing together two lines of work which have tended to remain separate: 'analyses of the Thünen type which, in spite of the Germanic origins, have hitherto been mainly American in their urban applications, can act as a valuable complement to the predominantly inductive approaches that have characterized much of the best work in the German morphological tradition'.²⁷ That these two lines have been separate is a clear indication of the problem posed in this chapter, of the regrettable separation of form from function.²⁸

It is possible to classify buildings by a more sophisticated measure for example that used by Corey and described in chapter 11 (pp. 206-8). This, together with the notion of cycles of historical change in Davies's scheme and Garner's interpretation of the structural segregation within retail nucleations of a different functional order, would provide a basis for the comprehensive, integrated study of the city centre. The problems of deriving appropriate analytical methods are difficult but already progress is being made in this direction.²⁹

Notes on further reading

The many studies on the internal business districts of cities begin with

PROUDFOOT, M. J. (1937a) *City retail structure* (see footnote 4)

PROUDFOOT, M. J. (1937b) *The outlying business centres of Chicago* (see footnote 4)

and an early British study is

BURNS, W. (1939) *British shopping centres* (see footnote 5)

Other studies are

BERRY, B J L (1962) *The commercial structure of American cities a review* (see footnote 9)

CAROL, H (1960) *The hierarchy of central functions within the city* (see footnote 6)

DUTT, A K (1969) *Intra city Hierarchy of central places Calcutta as a case study* (see footnote 21)

GARNER, B J (1966) *The internal structure of retail nucleations* (see footnote 13)

JOHNSTON, R J (1966) *The distribution of an intra metropolitan central place hierarchy in Melbourne* (see footnote 17)

JONES, R (1967) *Central place theory and the hierarchy and location of shopping centres in a city Edinburgh* (see footnote 19)

For a study which argues for a continuum in shopping centres see

BEAIDN, K E O (1972) *The intra urban continuum of shopping centres in Cape Town* *South African Geog Jnl* 54, 58-71

A succinct statement of a typology of business centres is given in

BERRY, B J L (1967) *Geography of market centres and retail distribution* (see footnote 9) 42-58, *The urban case*

Further studies are included in the central place bibliographies noted at the end of chapter 5

Studies on the direct relation of form and function are, except in a general way, much fewer. The following can be consulted

GARTER, H (1968) *Urban systems and town morphology* (see footnote 28)

DAVIES, W K D (1968) *The morphology of central places a case study* (see footnote 22)

WHITEHAND, J W R (1972) *Building cycles and the spatial pattern of urban growth* (see footnote 26)

15 IMAGES OF THE CITY: THE CITIZEN'S VIEW

1 APPROACHES TO PERCEPTION STUDIES

Over most of this book it has been implicitly accepted that the city can be treated as a natural object, a phenomenon in space which is perfectly perceived and perfectly comprehended by all those who form part of it or establish relations with it. This view has been modified at two points. The first was in the consideration of consumer behaviour in relation to the central place system where it became apparent that, although on an aggregate scale such a system was discernable and could be interpreted as the product of the activities of shoppers and entrepreneurs over time, on a disaggregated scale consumer behaviour was by no means in accord with the principles derived from the aggregate analyses. In the resolution of this apparent conflict a more sensitive behavioural approach was found to be essential. Likewise in looking at residential patterns it was evident that, although distinctive social areas could be identified, any family's decision making process on where to live was extremely complex and derived from the way in which they assessed their needs in relation to their knowledge of the city.

Thus we may say that, for the citizen, the objective city does not exist. Every inhabitant has most certainly a partial and most probably an idiosyncratic, view of the urban environment in which he or she lives. In chapter 8 where town plan was examined it was proposed that the totality of plan reflected culture, in this sense an aggregate concept divorced from the individuals who make it up. But the view from the drawing board, or the view from the aeroplane, is not the view of the citizen on the ground and in the street, for there the prospect is limited—as it is from any perspective, including the planner's—and the scene partial. A strongly growing element of urban geography has therefore focused on the establishment and analysis of images of the city and, in the geographer's particular line of interest, the development of mental (cognitive) maps which translate the images into a spatial framework. These mental maps, or images, of the urban environment can then be examined in relation to the characteristics of the people concerned. There still remains, of course, the problem that these characteristics are ultimately associated with psychological or personality types.

With Gollidge it is possible to view consumers as Marshallians who behave as economic man as Pavlovians who develop repetitive patterns of behaviour via a learning process, as Freudians who are fantasizers and react capriciously to stimuli such as advertisements, and as Veblenians who follow the example set by their peers.¹ But in spite of the difficulties indicated by personality characteristics it is still possible to consider images of the city in relation to the standard variables which have been consistently used in social geography—socio-economic status, sex and age for example.

Downs has proposed three types of approach characteristic of work on geographic space perception.² The first of these is the *structural approach* which is concerned with the way in which the array of information about a place is perceived. It is evident that all the sense perceptions, all the impinging data about an environment cannot be remembered. There is therefore, a process of selection and ordering, a structuring which has to take place. On this basis it is postulated that mental maps of a city are constructed in which useless detail is discarded and the data necessary for the purposes of the individual such as finding the way from A to B are retained. Secondly, the *evaluation approach* goes somewhat further in that it is not only concerned with the way the environment is structured but also how it is evaluated in relation to decisions to be made and subsequent action to be taken. Thirdly, the *preference approach* is directed towards the way in which preferences are developed among a set of objects distributed in space. Evaluation and the identification of preferences are somewhat similar and they have been in part considered in relation to consumer behaviour in chapter 7 and location decisions as to residence in chapter 11. This chapter will, therefore, concentrate initially on the structural approach and concern itself mainly with the physical and visible character of the townscape.

2 A TYPOLOGY OF URBAN PERCEPTION

Before considering more precisely how images of the townscape can be put into some structured array it is useful to consider a typology of urban perception which identifies the ways in which such images are derived. Appleyard has proposed a threefold classification.³

¹ R. C. Gollidge (1960) Some equilibrium models of consumer behaviour *Econ. Geog.* 46, 417-25.

² R. M. Downs (1970) Geographic space perception: past approaches and future prospects *Progress in Geography* 2, 65-108.

³ D. Appleyard (1973) Notes on urban perception and knowledge, in R. M. Downs and D. Stea (editors) (1973) *Image and environment* (Chicago and London), 109-114.

(i) *Operational perception* People become aware of many elements in the city because they use them as reference points in their everyday life in getting about in the city or simply getting to work. Bus stops or traffic intersections, key buildings or distinctive physical features are noted, remembered, and probably in turn exaggerated in importance, in the process of creating a working mental structure of the city. This is undoubtedly the most universal of the types of perception derived as it is from repetitive activity. At the same time in this process some parts of the city will remain virtually unseen, certainly unremembered, and perceptually invisible as the individual journeys from distinctive feature to distinctive feature. For example, only parts of buildings may be remembered. A shop may often be recalled only in terms of its ground floor identity and the window it displays to the public while the architectural character of the whole building may remain completely unknown.

(ii) *Responsive perception* Awareness of city images will be closely related to distinctive or unusual features which generate an immediate response. 'bright, isolated, singular and distinctive elements intrude on the operational search patterns of the traveller or catch the eye of a gazing passenger'. The role of the advertising industry is to elicit this sort of response by the use of distinctive designs or colours, by employing sexual imagery or establishing a conditioned reflex to easily remembered, catch phrases.

(iii) *Inferential perception* This awareness relies on past experience and is realized by inference from parallel situations. An unknown city is likely to conform in much of its general character to that of a large number of known cities. From experience it is possible to find one's way about in a strange city by using accumulated knowledge of the structuring of urban areas in general.

Given the types of perception the major academic problem was the devising of some analytical system which reasonably represented the way in which city images, the perceptions themselves, are structured. This was solved, at least partially, by Kevin Lynch in his book published in 1960 and appropriately entitled, *The image of the city*. Lynch proposed five elements through which the physical structure of the city was visualized.

- 1 *Paths* are the channels along which people move within the city and, as a result, they tend to predominate in urban imagery since movement usually promotes observation. The characteristic problem of

anyone in a city is how to get from A to B and hence the path becomes the dominant remembered feature

- 2 *Edges* are linear elements which represent distinctive physical breaks within the city. They can be natural features, such as breaks of slope, sea or lake shorelines or river fronts. They can also be man-made features such as the distinctive breaks brought about by railways or urban motorways.
- 3 *Districts* sections of most cities are immediately identifiable to the inhabitants and usually have local names. The most universally known are associated with distinctive activities, cultures, or groups such as Soho in London, Montmartre in Paris or Harlem in New York.
- 4 *Nodes* certain points in the city, most often road junctions, stand out as nodes or foci. The citizen can enter into or pass through these nodes and they represented easily identified stages in movement within the city. Often they are clearly demarcated physical elements as in the city square, Piccadilly Circus, Times Square, Red Square, the Etoile are all nodes.
- 5 *Landmarks* differ from nodes in that they are features which can be observed but not normally entered or passed through. The name itself indicates the role these have played to the navigator at sea in its earliest meaning and to the stranger in the city at the present. Distinctive buildings or features stand out as being easily identifiable and easily retained as images to be used in structuring the mental map of the city. The landmark can be used to epitomize the whole city. When a tired film or T.V. producer wants to indicate that his action is taking place in Paris then the opening sequence of shots is of the Eiffel Tower; if it is in London then Big Ben appears and if it is in New York it is either The Statue of Liberty or the Manhattan skyline.

It is evident that few individuals consciously use these five elements as such and that they constitute together an arbitrary system for analysing the image of the city held by people or groups of people. The elements will also have different meanings for different people or even for the same people at different times: an urban motorway is a path to a motorist but an edge to a pedestrian. Lynch compares two maps: one showing an outline map of Boston and the other 'the visual form of Boston as seen in the field',⁴ but although derived from field reconnaissance this must be described as an urban analyst's view of Boston for in this sort of study there are no absolutes, only images.

⁴ K. Lynch (1960) *The image of the city* (Cambridge Mass.) 18-19

Lynch's major contribution was to provide the simple but basic tools by which the way people structured their image of the city could be realised and the perceptions of different groups compared.

Lynch proceeded by means of office and street interviews to build up a number of Boston images, but perhaps the critical concept is the notion of 'different groups' and the contrasted way in which they perceive city space. The problem of the nature of such groups immediately follows and it would seem sensible to relate them to the dimensions which in factorial ecological terms differentiates the urban population. A large number of completely individual and particularistic views can be derived, but will add little to the purpose of this investigation. The psychologist might be interested in how the city appears to the sufferer from claustrophobia or agoraphobia but such abnormalities are rarely the geographer's immediate concern. The dimensions of ecological studies imply that the image of the city will vary according to socio-economic status, life cycle stage and ethnic origins.

3 CITY IMAGE AND SOCIO-ECONOMIC STATUS

Francescato and Mebane have reported in a preliminary way their attempt to consider images of Rome and Milan. Their respondents were broken down into groups by status, age, sex and whether or not they were natives of the respective cities.⁸ Figure 15.1 reproduces the images of Rome of the middle-class (15.1a) and lower class (15.1b) subjects using Lynch's analytical techniques. Social class was determined by using occupation and education as indices. 33 respondents were ascribed to the middle class and 27 to the lower class. The contrasts are immediate and obvious. The middle-class group identified a much larger number of elements over a much wider spatial extent. The reasons seem straight forward, greater wealth provides greater mobility, a wider range of cosmopolitan interests and a greater propensity to use all the widespread resources of the city. Poorer people are less mobile, are more likely to have a shorter journey to work, will not use the range of city resources and so will be less exposed to city space. The authors suggest an alternative explanation. They suggest that the tendency for the lower class to produce maps covering only very small areas but indicating a good deal of local detail, reflects the home orientation which is characteristic of poor Roman families. This is undoubtedly a relevant feature, but such localism is

⁸ D. Francescato and W. Mebane (1973) How citizens view two great cities Milan and Rome in R. M. Downs and D. Stea editors (1970) 131-147.

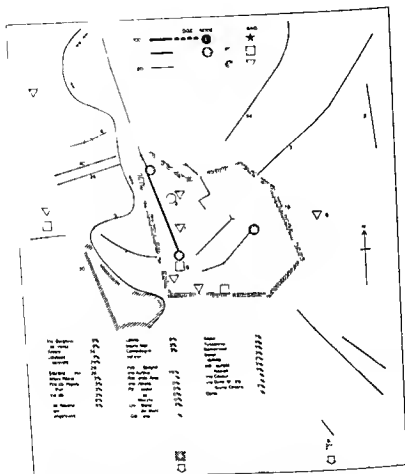


Figure 15.1 Images of Rome After Francesco and Mebane (1973) A Middle class image of Rome

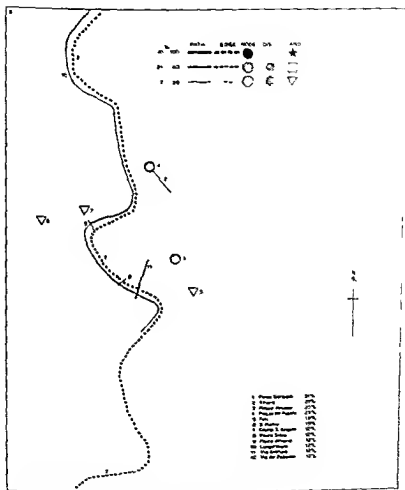


Figure 15-1 B: Lower-class image of Rome

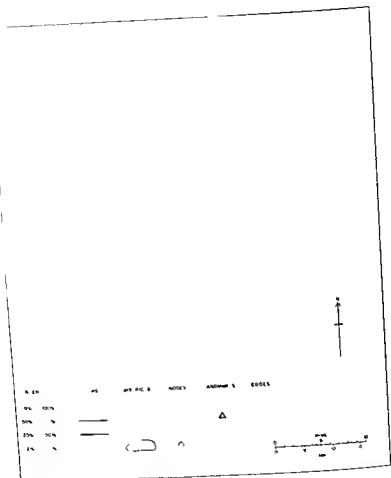
itself an aspect of poverty, although certainly a stress on home life and the neighbourhood exacerbates the limitations following directly from lack of wealth

4 CITY IMAGE AND ETHNICITY

One of the most frequently quoted examples of an imagery of the urban environment is the pilot study by the Advance Planning Section of the Los Angeles City Planning Commission.^{*} In this 25 respondents were asked to draw maps of Los Angeles, from which a general representation for each of the groups was produced. Three of these composite city image maps are reproduced here (figure 15.2). Figure 15.2a is the city image of the sample from Avalon, a delightfully wry name for a predominantly black area in the south of the metropolitan area and a little to the north of the better known Watts. Figure 15.2b is that of the sample from Boyle Heights, an almost exclusively Spanish-speaking tract adjacent to the central industrial and commercial areas. The third image of Los Angeles is shown in figure 15.2c and represents the sample from Westwood, a white upper class neighbourhood, located on the southern fringes of the northern hills between Beverley Hills and Santa Monica. These three maps require but little exegesis. The white upper class image is extensive in reach and detailed in content, that of the Avalon residents is limited in reach and has less city wide detail, only a low proportion of respondents are even aware of the universally known residential areas such as Hollywood. It is also noteworthy that the white image is dominated by the east-west grain along the lines of the well known boulevards, such as Wilshire and Santa Monica, which skirt the Hollywood Hills and Santa Monica Mountain. The black Avalon image, in contrast, is dominated by the north-south grid of the plain and related to access to the CBD. Finally the Boyle Heights composite image is most severely restricted and is limited to what is little more than the immediate neighbourhood.

Although these three images are related to ethnic and segregated groups it is not possible to sustain this argument without qualification. Socio-economic status, or access to mobility via wealth, must be invoked also. Nevertheless these results lead on to notions of ethnically based territoriality, and most certainly participation in the whole city-wide range of activity is related to assimilation into the larger urban community. The ghetto has been considered in its spatial context in an earlier chapter but now it can be clearly seen as a

^{*} Department of City Planning (1971) *The visual environment of Los Angeles* (Department of City Planning, L.A.)



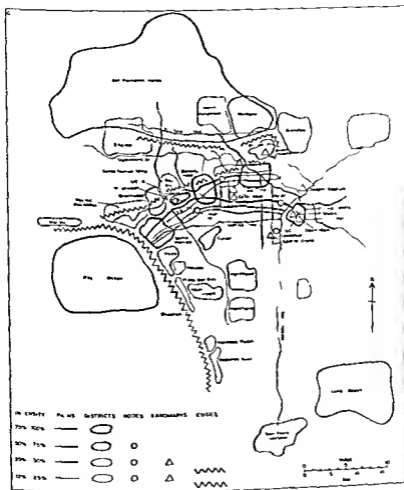


Figure 15-2C Westwood

constricting feature. Gerald Suttles in his book, *The social order of the slum*, subtitled 'Ethnicity and territory in the inner city', develops the way in which restriction grows, 'For persons in the Addams area [his name for that part of Chicago with which the book is concerned] only the adjacent neighbourhoods are well defined. Beyond this, their notions of established boundaries become vague and uncertain. Each little section [of the city] is taken to be a self-sufficient world where residents carry out almost all their legitimate pursuits. A person who leaves his own area then, is suspect so long as he has no visible and justifiable reason for straying from his home grounds.'⁷ He continues (p. 228), 'Individuals in the Addams area achieve a positive association with co-residents of the same age, sex and ethnicity primarily because conflict with other persons forces them together into small face-to-face groupings so positive a role for conflict cannot be appreciated unless it is placed in a developmental sequence. At the outset parents do not prescribe a definite set of persons [but] voice a variety of proscriptions. "Don't go out of the neighbourhood" "Don't you get off the block"'. Injunctions of this sort do not initially produce positive associations but only territorial aggregates'. In this detailed study Suttles outlines the processes by which territorial restrictions emerge and it is these which are eventually revealed in the severely restricted images of the total city which many ethnic minorities display.

The notion of the restriction of the individual's use of city space introduces the ideas contained in Hagerstrand's 'time geography' model of society.⁸ Most human activities are space consuming but 'while the space packing of urbanization allows time savings for both individual and society it also creates interregional and intraregional social and economic inequalities'.⁹ There are two components in the model. The first is a life perspective environment which takes in all those places a person might encounter throughout his life and the second is a daily life environment which is theoretically limited to the effective distance that can be covered, with return, in a single day, rather like the bounds set on a medieval market. Every individual can be thought of as contained by constraints within a time space envelope. Some of these constraints are directly biological, like the need for sleep which

⁷ G. D. Suttles (1968) *The social order of the slum: Ethnicity and territory in the inner city* (Chicago) 15. A paper of considerable interest is, D. Ley and R. Cybriwsky (1974) 'Urban graffiti as territorial markers' *Ann Assoc Amer Geogr* 64, 491-505.

⁸ T. Hagerstrand (1970) 'What about people in regional science?' *Papers Reg Sci Assoc* 24, 7-21.

⁹ A. R. Pred (1973) 'Urbanization, domestic planning problems and Swedish geographic research' *Progress in Geography* 5, 37. This paper contains a full review of Hagerstrand's ideas.

restricts the reach of daily travel, but others are socioeconomic and determined by deployable resources. In this sense city image is restricted by the nature of this inhibiting envelope.

It is worth adding one other point which is apparent from the maps in figure 15.2, although it is not related to ethnicity. Lynch discussed the imageability of the city,¹⁰ that is, the extent to which it threw up clear and distinctive images. Examination of the Los Angeles maps will indicate that they are dominated by paths and districts and that there is a lack of nodes and landmarks. This tends to confirm the popular impression of the city as dominated by the automobile as a mass of suburbs (districts) linked by freeways (paths).

5 CITY IMAGE AND THE LIFE CYCLE

Two aspects of this relation arise

- 1 *The development of spatial cognition* this sort of study is concerned with the way in which spatial cognition develops in the child from birth. This book is most certainly not the proper place to include a review of work on this topic. It is a highly specialised field and a lengthy review of the literature is available.¹¹ It is included here as a heading, since it is a part of the life cycle relation to the image of places.
- 2 *City image and age groups* different age groups, different life cycle stages, will be concerned with different aspects of the city. One of the best known studies in Britain was carried out by Brian Goodey *et alia* in Birmingham.¹² A rather unusual means of collecting data was used: readers of the *Birmingham Post* were asked to send in spontaneously drawn maps of the central area of the city. Goodey reported that 'we found evidence for youth housewives and old people's maps of Birmingham and for the two latter the maze of recently opened city underpasses emerged as very severe blockages to mobility and urban navigation'.¹³

It would be wrong to give the impression that the three dimensions which have been discussed are the only determinants of city images or

¹⁰ K. Lynch (1960) 9-13.

¹¹ R. A. Hart and G. T. Moore (1973) 'The development of spatial cognition: a review' in R. M. Downs and D. Stea (eds) (1973) 246-88.

¹² B. Goodey *et alia* (1971) 'City scene: an exploration into the image of central Birmingham as seen by area residents' *University of Birmingham Center for Urban and Regional Studies Research Memorandum* 10.

¹³ B. Goodey (1973) 'Regional and urban images in decision making and planning' in J. Rees and P. Newby (eds) (1973) 'Behavioural perspectives in geography' *Middlesex Polytechnic Monographs in Geography* 1.

indeed that only the visible elements that can be translated into Lynch's terminology are involved. In chapter 10 the central business district was considered as an objective area of the city and appropriate methods of delimitation sought. Even so it was noted that the earliest attempts were based upon local opinion, thus through image studies the wheel turns full circle and geographers are once more concerned with local views, for if consumers behave in a way not in keeping with the dictates of economic man then it is likely that views of the CBD will also vary. This has been the subject of an investigation by Klein who attempted to establish varying definitions of the town centre by contrasted groups.¹⁴ A random sample of subjects, 1118 in all, was selected from a number of clearly defined residential areas. These respondents were then given a set of twenty four photographs of the city centre and were asked to divide them into three categories, 'town centre', 'not town centre', 'unknown'. Analysis of the results was then undertaken in relation to a number of variables characterizing respondents including socio-economic status, age, sex, length of residence and location of residence. This was done by calculating, for each of the photographs, the percentage of the total sample which judged it to be of the 'town centre' and then calculating the deviation from the average for each of the subgroups determined by the variables. Two of the subgroup analyses can be considered briefly.

Figure 15 3a represents a west east profile across the city identified by five of the photographs. The responses of three groups are examined in relation to these five points, those who lived to the west of the town centre, those who lived to the east and those who lived in the inner city. These groups are represented by graphs which indicate the deviation from the average in percentages. This figure demonstrates that those who live in the west exaggerate the town centre by extending it in a westerly direction, while those who live in the east do the same in an easterly direction. Those who live in the inner city over-estimate the central point and under-estimate the extensions both to east and west and although there are no statistical tests to match place of residence against the other variables, it seems that this locational bias is independent of them. Klein suggests that this result may be due to the fact that people tend to use that part of the central area nearer to them, or at least to be more familiar with it. But he also adds that it may be wishful thinking and a determination to believe that the city centre is nearer than it actually is, thus introducing another problem in this field, the notion of subjective distance. These results bring to mind the

¹⁴ H. J. Klein (1967) The delimitation of the town-centre in the image of its citizens in W. F. Heineberger et alia, editors (1967) *Urban core and inner city* (Leiden), 286-306.

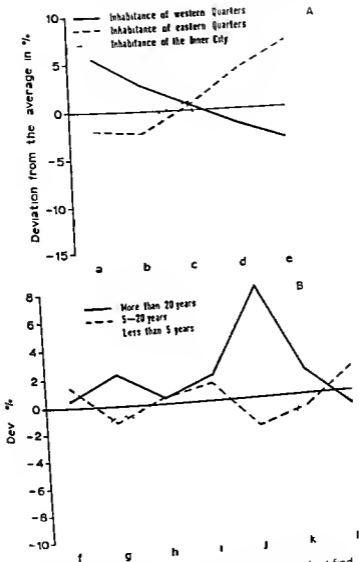


Figure 15-3. The town centre of Karlsruhe as identified by citizens After Klein (1967) A West east profile in relation to place of residence B: North south profile in relation to length of residence In these two cross sections the points labelled a to l represent the points from which photographs were used in the study a to l are five places ranged from the west to the east, with f to l seven places ranged from north to south Note also that the city centre of Karlsruhe has tended to shift to the west in recent years This is reflected clearly in the responses of the inner inhabitants in graph A and by the newer residents in graph B

work of Brennan¹⁵ in Wolverhampton, who found that housewives did not use the nearest shop for a good but the nearest in the direction of the CBD, that is they turned citywards not because of an intervening opportunity but possibly because movement into the city was dominant and this created the illusion that it was easier.¹⁶

The second example from Klein's study is shown in figure 15.3b where seven points along a north-south profile are related to length of residence in the city. Those who have been in the city the shortest time, like the younger age group, have a much more restricted view of the town centre. Especially remarkable is the disagreement over point 'j', the Festplatz. This is a point on a southern extension of the centre dominated by cultural features and a traditionally distinctive feature of the city. Those who have lived in the city most of their lives insist that it is part of the town centre whereas the newcomers have no such sentiment. Clearly there is great complexity in the image the citizen builds up, for not only is it related to standard social variables, but to location, length of residence and to all those personal quirks which belong to the individual. Beyond the objective city is the city which people use, controlled by the images they hold for 'behaviour depends on the image'.

5 PRACTICAL AND ACADEMIC RELEVANCE

At this stage it is likely that the question will be put as to what use there is in these sorts of studies, for are they not just another passing geographical fad? It is possible, however, that these represent a most important area for at least a departure is made from the academic's city to that of the people who live and work in it. Four uses of city image studies can be suggested.

- 1 Attention is drawn to the imageability of the city. It is easy from the geographer's viewpoint to forget that the city is a built form that should give visual pleasure, 'voluptas' as the Renaissance theorists called the quality. Aesthetic pleasure must be related to the quality of the images the city creates and hence city image studies call attention to qualities too easily ignored in social science and passed over to the architect's care.¹⁷
- 2 On a large scale the efficiency of a city depends on its imageability for the ease with which people can get about, with which motorists

¹⁵ T. Brennan (1948) *Midland city* (London)

¹⁶ T. R. Lee (1962) Brennan & Law of shopping behaviour *Psychological Report* 11 662

¹⁷ For an interesting analysis related closely to Lynch's work see G. Clay (1973) *Close up: how to read the American city* (Washington D.C.)

can find their way is closely related to its legibility, that is the ease with which distinctive images produce a sequence that can be followed. On a small scale these qualities become related to any single building, for social processes depend upon environmental organization. The concepts of sociopetal space and behaviour watching may be applied to explicit social areas as well as to lobbies or hallways. Every natural traffic pathway is a potential supplier of encounters which can become interactions. Therefore the social space located at the far end of a hall, or even halfway down the hall, from the entrance has part of its therapeutic function diluted.¹⁸ Again it is quite evident that, though the geographer will have an interest in these studies since they are concerned with the organization of space, the prime mover in them will tend to be the architect or the psychologist.

- 3 The third way in which these studies are of value relates to the fact that they reveal the images of the city of the everyday user and therefore also indicate the existence of major problems. Reference has already been made to Goodey's Birmingham study, where the problem of housewives having to navigate baby carriages through an underpass system was revealed. This type of work thus seems to be a way of introducing public participation into planning processes.
- 4 The last area of relevance is one of critical importance to the cities of the twentieth century. Deprivation, and its identification by means of socio-economic indicators, is a fashionable academic study. To a great degree the emphasis here is structural and related to systems of social stratification. But it should also be locational and geographical and nowhere is this more clearly revealed than in the maps drawn by the poor and the ethnic minorities. It is true that social and economic disadvantage and locational disadvantage are part of each other, though not exclusively so. It is an ironic possibility that in Britain the drive to create a comprehensive education system may, in its early stages, have only substituted locational disadvantage for structural disadvantage, and as a result may have made the education opportunities of the intelligent working class child much worse than they were before. If this is so it is due to the limited impact of geographical education itself and the inability, indeed unwillingness, of people to think in spatial terms. In America the 'busing' of children across cities in order to avoid schools of exclusive ethnic character is an attempt to solve a

A book dealing with environmental psychology from the architects point of view is

J. LANG *et alia*, editors (1974) *Designing for human behavior architecture and the social sciences* (see footnote 18)

Apart from the bibliography published by Goodey, the paper by Downs (1970) and the books edited by Downs and Stea (1973) by Michelson (1970) and by Lang *et alia* (1974) contain lengthy bibliographies

16 URBANIZATION AND URBAN GEOGRAPHY

The nature and consequences of urbanization are of prime significance both to the developed and the less developed parts of the world. Indeed the whole future of mankind is closely bound up with the changing significance and role of the city. The urban geographer, whether he defines the scope of his work by the subject-matter he treats or by the particular perspectives he adopts, can only consider a small part of the totality which is expressed in the idea of urbanization. Even so, as the geographer reviews his work he will inevitably be strongly influenced by the attitude he adopts to the city. At the same time his study is not academically static, nor does the urban phenomenon itself remain unchanging. In consequence there are three topics which this conclusion needs to discuss. The first of these is attitudes to the city, the second is the changing nature of the city and the third is the impact of these on urban geography as a systematic branch of the subject, a topic with which the book began and which can now be reviewed in the light of the content presented.

1 ATTITUDES TO THE CITY

This book has quite openly been written from the context of the western industrialized world. Although attempts have been made to present a wider perspective at certain points, given the background and experience of the author it would have been over-ambitious to have ventured to present anything else. In western culture the attitude to urbanism has always been ambivalent, an ambivalence which it has slowly grown more popular to identify and trace so that only a brief outline is given here.¹

On the one side the city has been seen, to use standard moral terms, as the epitome of all that is evil or, in the terminology of Wirth, anomie and alienating, disrupting the elemental cohesion of the social group and disintegrating the personality of the individual. The sources

¹ See for example, *The city in the history of ideas*, Part III of O. Handlin and J. Burchard editors (1963) *The historian and the city* (Cambridge, Mass.), and G. R. Stange (1973) *The frightened poets*, chapter 20 in H. J. Dyos and M. Wolff editors (1973) *The Victorian city: images and reality* (London) 475-84.

of this attitude he deep in the cultural inheritance. Prime among them are the Christian religion and its Judaic antecedents. Christianity originated among a people of the desert fringes whose folk memory and preserved tradition in the Old Testament, were those of the nomadic herdsman. The city was presented as destructive of the purity of religious belief and practice, bringing with it alien notions and false gods. The cities of the plain were a synonym for luxury, looseness and idolatry. Sodom and Gomorrah perished to demonstrate the fate of the urban idea. Through Christianity these attitudes became embedded in the consciousness of western man.

We may also note that Europe, as it emerged as a meaningful region after the collapse of the Roman Empire, was made up of a complex mosaic of small culture regions most of which have retained their identity, and some of which still have their distinctive languages. Brittany and Wales, Catalonia and Galicia, Flanders and Bavaria are examples. These culture regions, often governed in the form of principalities or duchies, were subject to the process of more or less arbitrary unification, through battle or marriage bed, into the united kingdoms of the latter middle ages and of modern Europe. In this nation building operation the central and capital city played a leading role. Indeed, the political unit was often forged about the city so that, for example, the name of the small area about Paris, the Ile de France, became extended to cover a whole country. By these means both symbolically and physically the city came to represent the cosmopolitan ideal, the destroyer of the folk cultures in the interests of national unity. 'In the city remote forces and influences intermingle with the local their conflicts are no less significant than their harmonies. And here, through the concentration of the means of intercourse in the market and the meeting place, alternative modes of living present themselves the deeply rutted ways of the village cease to be coercive and the ancestral goals cease to be all sufficient. strange men and women, strange interests, and stranger gods loosen the traditional ties of blood and neighbourhood.'²

The industrial city of the late eighteenth and nineteenth centuries provided a further impetus to anti urban attitudes, not only by contributing to the erosion of the older folk cultures but by the creation of the most appalling physical conditions and concomitant social degradation. Wirth, following the views of Tonnies and Durkheim, was able to adapt into nascent urban sociology the inherited prejudices of the past.

In the present century the history of urbanism has provided enhanced

² L. Mumford (1938) *The culture of cities* (London) 4

stimuli for these anti urban views. The obsolescence of the city centre has contributed to the creation of slum and ghetto and provided the environment of urban poverty. The avoidance of city centre problems by the process of suburbanization, together with increasing car ownership, have brought immense pressures to bear on urban transport systems. Such are the pressures that urban motorways, to solve circulation difficulties, destroy houses and add to housing problems. The disposal of waste of all kinds from plastic containers to sewage and the exhaust fumes from motor vehicles, has created major crises of pollution. The attempt to escape from the noise and dirt of the city generates saturating demand for what open space is accessible, yesterday's wildernesses are tomorrow's urban parks. Finally the vulnerability of the city has been revealed. It is exposed to any break down in its complex sustaining systems. It is vulnerable to the pressure of active sectional interests above all it is vulnerable to the urban guerrilla and to the direct political violence of a few determined and fanatical individuals.

From the sources considered so far comes an attitude which decries the city at least in its contemporary western form. This attitude has the core of traditional romanticism buried deep within it. It reverses the Christian dogma for those on whom religion exerts no overt influence. Man may be viewed as not being inherently wicked by virtue of original sin and in need of redemption, but rather as a noble being corrupted by the vicious regime of the competitive capitalist world. That corruption is most marked in the symbol of that world, the city, the least 'natural' feature of the earth's surface which 'represents the maximum possibility of humanizing the natural environment and naturalizing the human heritage'.³ This romantic reaction perpetually rises to the surface in urban writing. It is nicely illustrated in Bunge's study of Fitzgerald (*Detron*)⁴ in which although the author attempts to deny such a basis it nevertheless appears, almost creating a latter day version of the *Lyrical Ballads*, complete with updated versions of Ruth and Michael. Even the idea that, if natural man is corrupted in the urban world, then the nearest to innocence and virtue must be the child is strongly pressed, for Bunge writes, 'this is a book in defense of children. This book is designed to make us grow up, that is, to make us more childish'.⁵ Or as Wordsworth phrased it

Not in entire forgetfulness,
Not in utter nakedness,

³ L. Mumford (1938), 6

⁴ W. Bunge (1971) *Fitzgerald: geography of a revolution* (Cambridge, Mass.)

⁵ W. Bunge (1971), 242

But trailing clouds of glory do we come,
 From God, who is our home,
 Heaven lies about us in our infancy
 Shades of the prison house begin to close
 Upon the growing Boy⁶

Wordsworth's views are more tangibly anti urban than Bunge's—

He in the dissolute city gave himself
 To evil courses ignominy and shame
 Fell on him⁷

—but even so this romantic view, through the notion of the geography of a revolution, is exerting active influences on urban geographers

On the other side of this ambivalence towards the city is the view which maintains that the city is the greatest of all man's creations displaying in physical form all the achievements of mankind—naturalizing the human heritage. In the city, as has been demonstrated already in this chapter, different cultures and traditions meet and mix and it is from this mixing and cross fertilization that innovation is born. New ideas and new techniques are diffused from the city and down the urban hierarchy, technical achievement and philosophical innovation are not usually related to the conservative, unchanging tradition of the countryside but to the creative flux of the city. Even if Christianity originated in a peasant community, it had to become Greek in philosophy before it could become universal and to be spread by Roman technology.

It is worthy of note that in attempting to produce a unifying theory of the town Claval has stressed that the common ground between inter urban and intra urban aspects of geography lies in the maximization of social interaction.⁸ This is not far removed from Meier's communication theory of urban growth.⁹ Whenever the crux of urbanism is sought it tends to emerge as simply a way of optimizing intercourse between people and stresses the role of the town as the meeting and mixing point.

The emancipation from the restrictions of custom is the core of the freedom which the city dweller gains. Only away from the close control of tradition can freedom to experiment, or to be different, be realized only in the anonymous crowds of the city is true liberation possible.

⁶ For the purist, the author is aware that the *Ode on the intimations of immortality from recollections of early childhood* was not published in the *Lyrical Ballads*.

⁷ W. Wordsworth (1798). *Michael* from *Lyrical Ballads*.

⁸ P. Claval (1973). *Une théorie unitaire de la ville*. *Canadian Geogr.* 17(3) 276-9.

⁹ R. L. Meier (1962). *A communications theory of urban growth* (Cambridge, Mass.).

That very anonymity which was seen by Wirth as destructive of the individual, creates those conditions of freedom in which radical change is possible.¹⁰ Radical change is, however, not acceptable to totalitarian regimes either of the political left or right, so the city has spawned a means of inhibiting the very freedom it generates. This is the secret or thought police, who replace in an urban situation the restraints operated by convention in rural and small scale communities.

Finally detachment from the confines of the rural community transforms an immobile situation into one where mobility is an accepted part of life. Along with physical mobility comes social mobility through opportunity, for it permits each individual to stretch his talents to their full extent whatever the ends might be.

Truth or advantage does not always lie in one of two polar extremes and discussions of urbanism have long been dominated by the notions of an ideal mid-way situation. Most explicit of all the attempts to derive such a median view is that by Ebenezer Howard in the Garden City where the two extremes are set out as magnets of attraction. Perhaps earlier views of the 'città ideale' saw the way through the creation of an apt physical environment which would of itself generate an ideal society, while a Marxist interpretation would presumably argue for a socialist economy and the elimination of competition as a means of producing the ideal city. At this point the problem becomes more clearly defined because presumably under a Marxist state, as in all ideal worlds, there would be no further development, and yet the city is the centre of change. The city is the place where people meet, where great hopes are generated and where many must be disappointed, where success is balanced by disaster, affluence with degradation, for only where people become units of production, all alike, will the static city emerge in an environment of atrophy and decay.

It is probable that most people's attitudes to the city will take in both polar extremes, now moving towards one and now the other, as illustrated, for example, by Samuel Johnson on the one hand in *London* (1738) he writes

For who would leave, unbribed, Hibernia's land
Or change the rocks of Scotland for the Strand?
Here malice, rapine, accident conspire,
And now a rabble rages, now a fire,
Their ambush here relentless ruffians lay,
And here the fell attorney prowls for prey,
Here falling houses thunder on your head,

¹⁰ H. Cox (1965) *The secular city* (New York)

¹¹ E. Howard (1902) *Garden cities of tomorrow* (London)

And here a female atheist talks you dead
 LONDON¹ the needy villain's general home,
 The common shore of Paris and of Rome,
 With eager thirst, by folly or by fate,
 Sucks in the dregs of each corrupted state

but on the other (Boswell's *Life of Johnson*, 1791)

"Sir, if you wish to have a just notion of the magnitude of this city, you must not be satisfied with seeing its great streets and squares, but must survey the innumerable little lanes and courts. It is not in the showy evolutions of buildings, but in the multiplicity of human habitations which are crowded together, that the wonderful immensity of London consists." BOSWELL. "The only disadvantage is the great distance at which people live from one another." JOHNSON. "Yes, Sir, but that is occasioned by the largeness of it, which is the cause of all other advantages." BOSWELL. "Sometimes I have been in the humour of wishing to retire to a desert." JOHNSON. "Sir, you have desert enough in Scotland."

This argument has veered away from urban geography as such, but as geographers look for relevance, and beyond relevance for radical action, it will become clear that all the attitudes discussed impinge in their own way upon the academic study of the city. But before tracing these reactions it is necessary to turn aside to consider also how changes in the nature of the city itself are also affecting the study of urban geography.

2 THE CHANGING NATURE OF THE CITY

Chapter 2 of this book considered the problem of defining what is urban and it was suggested that one difficulty was that both the reality and the concept of what is urban are subject to change. The publication in 1961 by Jean Gottmann of his book *Megalopolis*, subtitled 'The urbanized northeastern seaboard of the United States', was a clear indication that new urban structures had been formed which needed new definitions.¹² Gottmann defined Megalopolis as 'an almost continuous system of deeply interwoven urban and suburban areas, with a total population of about 37 million people in 1960. The cradle of a new order in the organization of inhabited space'. The nature of this new order is not as easy to identify. Peter Hall in his

¹² J. Gottmann (1961) *Megalopolis: the urbanized north-eastern seaboard of the United States* (Cambridge, Mass.)

massive and masterly study of megalopolis England points out that 'for all his brilliant evocation of a megalopolis Gottmann never succeeds in defining it as a unique entity, and so never proves that it exists'¹³ Hall, after a careful and broadly based examination of evidence, accepts the reality of a megalopolis England but writes that it is 'a functional rather than a physical reality. Just like the comparable northeastern urban complex of the United States—Gottmann's megalopolis—it is a giant urban area only in the sense that here is a large tract of the earth's surface where the great majority of people depend on urban jobs and urban services, and where the impact of these jobs and services, in terms of measurements like commuter zones, service areas and the exchange of goods and information, expands to involve each part of the area in a complex series of interactions with other parts. It is not, and does not conceivably seem likely to be, a giant urban area in the sense that the physical growth of its parts will gradually coalesce into continuous sprawl from London to Birmingham and Manchester. That is a nightmare that has no foundation whatsoever in reality'¹⁴ This would equally be true of the Great Lakes megalopolis, the Japanese megalopolis extending from Tokyo to Osaka and the northwest European megalopolis extending generally about the Rhine from Randstad Holland to Stuttgart.

Although simple physical sprawl is rejected as the basis of identity, nevertheless the complex interdependence of parts recognized not only queries the definition of what is urban but more significantly, challenges the idea that any meaningful distinction between what is urban and rural can be made. If this be the case then the sorts of study presented in this volume, all of which to a large degree assume free standing, discrete urban entities, lose much of their central importance, or at least take on a somewhat dated appearance. There is some overlap between the subject matter of this book and Hall's study of urban England, but his main concern is with regional structure and much of his consideration is devoted to the broader problems of regional and economic planning. The point of emphasis moves accordingly to methods for building dynamic models in urban and regional analysis and to the sorts of study initiated by Forrester in the United States¹⁵ and Chadwick¹⁶ and Wilson¹⁷ in Britain. It is possible to maintain, as this book does, that these are different problems demanding their own

¹³ P. Hall, editor (1973) *The containment of urban England* (London), Vol. 1, 47

¹⁴ P. Hall, editor (1973) 320

¹⁵ J. W. Forrester (1969) *Urban dynamics* (Cambridge, Mass.)

¹⁶ G. Chadwick (1971) *A systems view of planning towards a theory of the urban and regional planning process* (Oxford)

¹⁷ A. Wilson (1974) *Urban and regional models in geography and planning* (London)

treatment, but the blurring of the urban rural difference presents real difficulty to urban geography as a systematic study

In spite of these difficulties it would be wrong to imply that conventional urban geography, as presented here, is now in some way outmoded. Although it is not as easy as it once was to build a study around the notion of the free standing city clearly divorced from its rural surrounds, the basic ideas outlined in this book still remain central to the urban analyst. The question of scale will be considered later in this chapter but even here it can be maintained that the critical issue has been simply an extension of scale. The studies of regional structure, already referred to in this section, attempt to resolve the mechanics of the massive agglomeration, including its apparently rural interstices. On the other hand in the studies of central places and of residential location presented in chapters 7 and 11, it was seen to be necessary to move into the micro-scale, behavioural approach. In spite of these extensions the basic patterns of intra- and inter urban distributions remain the same, and the changes in the nature of the urban phenomenon from discrete city to megalopolis, and the development of behavioural research, only reveal a hierarchically scaled situation where the basic and essential middle ground is taken by this book.

It is probable that a real challenge to the conventions of urban geography will come from a different though related source. Most of the analyses presented in this book assume a laissez faire situation, one of relatively untrammelled competition in a capitalist system. But such conditions appertain in reality to hardly any country in the world, for some form of control is exercised by central or local government. The United Kingdom may be taken as an example where the planning process now shapes the form of towns,¹⁰ determines the pattern of land uses and also, by the creation of new towns,¹¹ the city system

¹⁰ For a general consideration of U.K. urban planning see W. Ashworth (1954) *The genesis of modern British town planning* (London); J. B. Cullingworth (1973) *Problems of an urban society* (London), Vol. 1, *The social framework of planning*, Vol. 2, *The social content of planning*, Vol. 3, *Planning for change*; P. Hall (1973) *The containment of urban England* (London and Beverly Hills), Vol. 2, *The planning system: objects, operations, impacts*.

¹¹ There is an immense literature on new towns. Some useful books mainly relating to Britain are: F. Osborn and A. Whitlock (1963) *The new towns: the answer to Megalopolis* (London) (2nd edition, 1969); L. Rodwin (1956) *The British new towns policy* (Cambridge, Mass.); R. Thomas (1969) *London's new towns and Aycliffe to Cumbernauld: a study of seven new towns in their regions*; P.E.P. Broadsheets 510 and 516 (London).

More international studies are: P. Merlin (1971) *New towns: regional planning and development* (Trans. M. Sparks) (London); J. A. Clapp (1971) *New towns and urban policy* (New York).

Books mainly concerned with the U.S.A. are: G. Breckenfeld (1971) *Columbia and the new cities* (New York); C. Stein (1966) *Toward new towns for America* (Cambridge, Mass.).

itself. On the larger scale, towns are nominated as growth points²⁰ and every effort made to foster their development. On a small scale the planning permission required for the building of out-of-town shopping centres or hypermarkets determines the nature of the retail system. The study of urban geography in this way necessarily becomes closely involved with the consideration of the planning mechanism and the way it operates. This is nothing novel: when town plan was considered in chapter 8 it was stressed that the physical form reflected the nature of the society in which it was generated. Planning controls are contemporary reflections of social goals. It is significant that Peter Hall's book is called *The containment of urban England*, for that containment is the result of planning restrictions and Hall has to devote a great deal of his book to the study of the regulating enactments.²¹ A major difficulty for the urban geographer is this progressive involvement in the detail of planning legislation and the nature of its operation. Even so such planning may presumably be based on an initial examination of the patterns initiated by free operation under market conditions and to that extent urban geography provides the basis from which planning moves forward.

The first two sections of this chapter have indicated that numerous problems surround the idea of an independent, systematic urban geography and it is to a consideration of some of these that this conclusion must now turn.

3 PROBLEMS OF URBAN GEOGRAPHY

These problems which the systematic study now faces can best be considered under three headings. They are derived not only from attitudes to the city and the changing nature of the city already discussed but also from new views as to the internal organisation of geographical studies.

a *The problem of identity*

It has been suggested that the emergence of regional megalopolises puts in doubt the discrete urban geography which emerged in the 1950s and 1960s and which was depicted in chapter 1 of this book in diagram form. It has also been indicated that the regional model building

²⁰ Two useful books on growth point policies are: A. Kuklinski, editor (1972) *Growth poles and growth centres in regional planning*, U.A. Research Inst. for Soc. Devel. Regional planning Vol. 5 (Paris and The Hague); A. Kuklinski and R. Petrella, editors (1972) *Growth poles and regional policies*, European Coordination centre for research and documentation in social sciences Vol. 3 (Paris and The Hague).

²¹ P. Hall (1973) Vol. 2.

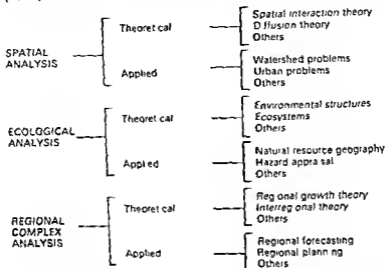
associated with these new phenomena must impinge on the material dealt with in urban geography, although again this book has made little concession in that direction. But even further, from within the mainstream of human geography itself comes a challenge to what is a short-lived but nevertheless received tradition of dividing human geography into semi-discrete areas of study labelled economic geography, political geography, urban geography, and so on. This problem was introduced briefly in the introduction where reference was made to the paper by Peter Gould in which the case is put most cogently.²² Gould points to the struggle in the post-war period to get such avant-garde courses as urban geography established in university departments. 'Few would object today but the irony is that just when everyone has comfortably settled down into new categories, these categories themselves have outlived their usefulness, becoming limitations upon geographic instruction and pedagogic imagination.'²³ This view has much to justify it. Gould proposes a twin orientation to geographical studies, spatial theory on the one hand and problem-solving on the other. But although his rather conversational-toned essay presents the idea, it is left unspecified in any detail. Probably still the most convincing contribution on theoretical lines is Peter Haggett's classic, *Locational analysis in human geography*.²⁴ The chapter headings of Part One indicate the approach—movement, networks, nodes, hierarchies, surfaces. The factual context or the real-world situation is irrelevant. Indeed, the basic principle is that these analytical approaches are universal to all spatial situations: that rent gradients should be studied separately in agrarian and urban geography is seen as nonsensical and the particularity of the present systematic approach only succeeds in presenting obstacles to theory formulation. All this implies that urban geography will soon disappear. Haggett in a later volume, *Geography: a modern synthesis*,²⁵ presents two contrasted internal structures of geography, one called 'orthodox', with standard systematic and regional sections, the other called 'integrated'. The latter is reproduced in table 16.1. Two difficulties stand out, apart from the somewhat imprecise content of such categories as 'natural resource geography'. The first is that it is not as easy to specify the various 'others' which appear in this scheme as in an orthodox one, but more relevant is that a close examination suggests that 'spatial analysis—applied—urban

²² P. Gould (1973) 'The open geography curriculum', in R. J. Chorley, editor (1973) *Directions in geography* (London), 253-84.

²³ P. Gould (1973), 269.

²⁴ P. Haggett (1965) *Locational analysis in human geography* (London and New York).

²⁵ P. Haggett (1972) *Geography: a modern synthesis* (New York), 451-4 (second edition, 1975).

table 16-1 • The integrated structure of geography *After Haggett (1972)*

problems' may be little more than the recreation of urban geography in another guise. The critical problem is that spatial theory is theoretic, and presumably deductive in approach. Gould justifiably attacks a subject which consists of gobblets of fact to be learned by rote, but that is not a fair interpretation of a demand for a clear empirical content. It is possible to envisage a future where the spatial theorist will derive his generalizations and manipulate his accessible data in some remote underground cell, never having visited a city or experienced its reality, not even through the descriptions of an old-fashioned regional geographer! Haggett's understandable desire to guard against this, and Gould's inclusion of problem solving or an empirical content, can be seen as recreating urban geography as the student attempts to contain the complexity of reality by restricting the range of his empirical investigations.

This is of necessity an inconclusive discussion. It is proper that the nature and content of the systematic studies in human geography should be challenged, and urban geography particularly is in a state of change. Three overlapping areas of investigation have already been indicated in the first two sections of this conclusion: the consideration of broader urban and regional systems, the operation of the planning

process and the growth of behavioural studies. These impinge on urban geography and demand modification of its content. Its separate identity is also challenged in a subject where spatial theory not surface form is seen as the heart. It is possible to question whether the theoretical bases have been sufficiently well established, and the theoretical material sufficiently well assimilated, to provide a meaningful synthesized programme for geography. At least there must surely be room both for those who seek an elusive theory and those who believe that theory is best indicated and will be more effectively derived from a consideration of distributed phenomena like the town. Perhaps in the end this is essentially a pedagogic topic rather than one concerned with a research philosophy. Certainly urban geography as presented in this book can do much to preserve an effective balance between abstract theory and the uniqueness of the real townscape. It also goes beyond the diktat of spatial theory in that it has to contain not only studies of the real townscape, or morphology and building types, but also to couch these in an evolutionary sequence. The city system and the fabric of the town have been built up over a long period of time and to exclude such a perspective makes nonsense of any effective view of the contemporary city.

b The problem of scale

A recent study of residential mobility concluded, 'this paper offers evidence of support of a limited directional bias in residential mobility and offers support for King's suggestion that emphasizing process or behavioural formulations in which process and structure are handled simultaneously will accomplish more than further attempting to analyse spatial structures alone'.²⁶ This implies that geographers must not only analyse spatial patterns (distributions in the old fashioned term), but also the bases of human behaviour which produced those patterns. The academic issue is evident and crucial. The interpretation of any spatial pattern leads to inferences about human behaviour, in the way that the behaviour of consumers was assumed in the central place model and inferred in empirical studies designed to illustrate the operation of the model. But these assumptions and inferences are at all times open to doubt and can only be verified by specific investigation of the behaviour in question, that is, by study carried out not at the aggregate scale of the distribution pattern, but at the level of the

²⁶ W. A. V. Clark (1972) *Some vector representations of intra urban residential mobility*, in W. P. Adams and P. M. Helleiner, editors (1972) *International Geography 1972*, Papers submitted to the 22nd International Geographical Congress, Canada, 178.

individual. This issue has been introduced in chapters 7 and 11 (see pp. 132-7, 291-300) and no further elaboration is presented here.

In many ways this problem in geography replicates an earlier one. The environmental determinism of Ratzel and his successors was not acceptable because, in its crude form, it was manifestly inappropriate for it made no allowance for the culturally based variety of human response. In consequence a possibilist approach was derived which argued the necessity of considering the filter of human culture through which alone the man-land relationship could be properly understood. It was subsequently maintained that, with the coming of spatial analysis, the old determinist-possibilist dichotomy was irrelevant and as dead as the dodo: a new geography had emerged. But this new geography, determinist in outlook through the assumption of economic man with neither individuality nor culture, has come up against the same problem: the need to consider the motivations and decisions of human beings who are not necessarily economic maximizers. The possibilists were, in their day, charged with moving into the fields of cultural and social anthropology and including material which met the stern charge of being 'not geography'. Fortunately that sort of thinking has largely, though far from completely, disappeared.

The human geographer is thus expected to investigate process as well as pattern, but this brings him into close contact with other social scientists, particularly the psychologist, as in the quest for process he is forced to consider the foundations of human behaviour. As this search for explanation advances it results in the phenomenon of reduction. Harvey writes, 'the development of general theory in the social sciences may well depend on such reduction. The postulates of economics may be reducible to a particular subset of postulates in psychology.

Some writers have further suggested that the basic postulates of psychology might be reduced to the basic postulates of physics. Anthropologists have also suggested that the route to a "value-free" and truly scientific anthropology lies through studying the neurophysiological determinants of human behaviour. The degree to which such reduction can take place, however, is a controversial issue, and even if it is conceded that total reduction is ultimately possible, this is so far from being practicable at the present time it seems irrelevant to the current problems of empirical enquiry.²² Even so this problem of reduction leaves the field of geographic enquiry very ill-defined. It is certainly possible to maintain (looking back at the discussion in chapter 1) that to define an area of enquiry that is exclusively geographical is a meaningless exercise. Investigation in the social

sciences becomes multidisciplinary and none more so than the investigation of urbanism. Any subject ends where the competence of the investigator runs out. In this way the question of identity is revived once again.

The difficulties of definition and content are not real problems, except for the academic student trying to contain his field of study. The residual issue still remains. This is the one of integrating approaches at different scale levels. Reverting to the problem of teaching geography, it is possible to envisage a structure where macro-geographical theory and micro-geographical theory would form elements as in economics. In a research context it is easier to ask questions than to provide solutions, but one critical point is that in all investigations the scale of approach must be specified and care taken to avoid the confusions that arise when conclusions are not scale related. Indeed research tackling scale problems directly needs to be initiated.

c The problem of relevance and radical geography

Two quotations can introduce this problem. The first is appropriately from Chairman Mao, 'If you want knowledge you must take part in the practice of changing reality. If you want to know the taste of a pear you must change the pear by eating it yourself.' For a western culture context it is a great pity that Mao did not refer to an apple rather than a pear, for the follow through of the implications might have made this section unnecessary. The second extract is from David Harvey's book *Social justice and the city*. 'An urbanism founded upon exploitation is a legacy of history. A genuinely humanizing urbanism has yet to be brought into being. It remains for revolutionary theory to chart the path from an urbanism based on exploitation to an urbanism appropriate for the human species. And it remains for revolutionary practice to accomplish such a transformation.'²⁸ A number of partly separate points arise from these quotations.

(i) *Learning for learning's sake* The view that this reserved piece of academic dogma is an unacceptable notion and no more than a myth which has been inherited from the conventions surrounding the education of a nineteenth-century English gentleman, is in part true. In a very limited sense the demand that geographic work should now be socially applicable has little point for there are very few urban geographers who have not at some time been involved in the use of

²⁸ D. Harvey (1973) *Social justice and the city* (London and Baltimore), 314.

- 1 To attack what is conceived as an 'injustice' at a particular *point* is both sensible and uplifting, as long as the injustice is clearly defined and comprehended and the benefit is not primarily to the social conscience of the attacker. But this cannot be the prime aim of academic study, however that is thought of, for it inevitably mistakes symptoms for disease. Symptoms can be locally and usefully alleviated, but the diagnosis of the disease is the task of the specialized practitioner. Like other things it is a matter of the appropriate scale.
- 2 The broader issues are, however, more difficult to resolve than the local and personal. Inevitably injustice—although perhaps misery and poverty are more appropriate terms, since justice is of the law and relative whereas misery and poverty are not—creates a demand for the elimination of 'exploitation' and for a step towards some millennial state whether it be in another world in the New Jerusalem or on earth in the city of Marx. But much of this is ill defined and loose romanticism disguised in social jargon. It has already been shown that the city, by the way it brings people of different views and different ways of living together, is a place of conflict. To use the dialectic, if it generates great achievements it also brings great disasters, if it creates high hopes it engenders grave disappointments. If the coin of anomie and alienation is turned over, on the obverse side are release from the bondage of convention and the liberty which is derived from anonymity. Inevitably Harvey ends his fine book with one huge question begging concept, 'an urbanism appropriate for the human species', for the synthesis of these opposites appears to be impossible.

4 CONCLUSION

This book, in the light of the volumes quoted above, appears as a manual, a sort of nuts and bolts study of the city from the point of view of a British geographer or to use Harvey's description of such works, a 'partial analysis framed within the safety of a disciplinary womb'. The impatience and occasionally the naivete of young geographers who, inspired with a desire to eliminate the ills of the city, wish to establish overriding theory, may at times dispose them to have little patience with this constrained level of enquiry.

It might well be that the implicit philosophy of this book is a sort of nineteenth century social Darwinism. It accepts the basic drive of competition for scarce resources and of conflict over advantageous locations, however muted, modified and regulated they may be by the

operation of constraints derived from community intrusion in formal political terms either at the local or national level. Competition, the survival of the ablest competitor and the demise of the weakest, is always the key whether it be for central place status among towns for retail sites by entrepreneurs or for residential locations by families. No doubt when the millennium arrives and such competition is done away with some geographer will need to write a very different book, critical discussion of the existing order will then be inconceivable for sophistry decrees that of perfection there can be no criticism which, like other aspects of Dystopia will have withered away. In passing it is interesting to recall that in More's Utopia all cities were identical and mirror images of each other for there was complete separation and no competition. Even so given something a little less than perfection and with the goals set by the community rather than by competing individuals and irresponsible interests priorities will still have to be identified and there will still be competitors for the physically limited resource of urban land and the advantaged locations even in the best of possible worlds everything cannot be located on the same spot and so inequality is written into the system in a more relevant form of environmental determinism. This last notion of the impossibility of identical location suggests that in futurology terms the most radical revolution of the sort of urban geography this book sets out will not be brought about by political philosophies but rather by transport technologies, for only by these can the intractable problem of distance be solved. When the friction of distance is universally reduced to zero there will be no advantaged locations and inequality will have been eliminated. But then there will be no towns and no urban geography.

Notes on further reading

On attitudes to the city a most useful source is

HANDLIN O and BURCHARD J editors (1963) *The historian and the city* Part III
The city in the history of ideas (see footnote 1)

A further source is

HADDEN J K et alia editors (1967) *Metropolis in crisis* (Itaska Ill.) Part III
Ideological perspectives: The anti urban bias

The problems of the modern city are dealt with in nearly every book on urbanism but a readable short book is

HELMER J and EDDINGTON N A editors (1973) *Urban man: the psychology of urban survival* (New York)

On the changing nature of the city the references in the footnotes should be consulted, particularly the books by Gottmann (1961) and Hall (1973) (see

footnotes 12 and 13) A general volume which is an excellent critical commentary is

BERRY, B. J. L. (1973) *The human consequences of urbanisation* (London)

In relation to urban geography the paper by Gould (footnote 22) should be read while the whole volume in which it appears contains much that is relevant

CHORLEY, R. J. editor (1973) *Directions in geography* (London)

Finally, two books deal with radical solutions to the problems of the city on two different scales For the general scale

HARVEY, D. (1973) *Social justice and the city* (London) is essential and contains further references For the local scale

BUNGE, W. (1971) *Fitzgerald geography of a revolution* (Cambridge Mass.) is an excellent example of the involvement of a geographer in social change

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